

1987

PERFORMANCE REPORT

WATER QUALITY SECTION



Environment
Ontario

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1987
PERFORMANCE REPORT
WATER QUALITY SECTION

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Water Quality Section
Laboratory Services Branch
Ministry of the Environment

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January 3rd, 1989

ACKNOWLEDGEMENT

This report is dedicated to the technicians of the Water Quality Section who, in the pursuit of quality data for their clients, performed the numerous analysis summarized in this report. The magnitude of this task becomes apparent when one realizes that each datum required analysis, graphical representation, evaluation and, in some cases, transfer to a microcomputer.

and

We gratefully acknowledge the contribution of Laurie McVicar, who provided the printout for the performance summaries and graphs.

ACGS

TD/380/P47/MOE

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Quality Control Program

The Water Quality Section of the Ministry of the Environment, Laboratory Services Branch is responsible for analysis of water quality parameters on a large number of samples. By using suitably sensitive instrumentation and methodologies in conjunction with carefully planned and monitored quality assurance programs, the Water Quality Section is able to maintain a high standard of analytical performance. This performance is certified through regular participation in interlaboratory round-robins. While results on these round-robins are not included in this report, they are available on request. This report does provide an outline of the Quality Control program, and a summary of performance data for 1987 for all the chemistry units. A description of the Microbiological Quality Control program is included in the second section.

The major objective of the Quality Control program is to ensure immediate detection and correction of unacceptable analytical performance. In practice, the activities are divided into continual checks of basic analytical tools such as chemicals, water purity, containers, instrumentation, calibration and recovery.

The quality control program for chemicals involves the purchase of high purity materials and regular analysis of these chemicals for contamination. An understanding of their shelf life and health effects is a vital part of this program. Distilled and deionized, distilled water sources are monitored daily for conductivity and dissolved organic carbon. Lines carrying these water supplies are inspected regularly and replaced when necessary. Stability studies for all solutions are conducted regularly and the data are utilized to specify shelf-life in method descriptions.

Sample containers, filters, glassware and all other equipment used in the collection and analysis of samples are checked for leaching, adsorption and contamination. The publication *"A Guide to the Collection and Submission of Samples for Laboratory Analysis"* (1985) contains recommendations for sample containers, preservatives and sampling techniques.

Calibration is achieved by using standards covering the analytical range, and is performed before the analysis commences. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling and preparation as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, one or more of the following checks is performed: calibration, blank, recovery or potential interferences. To obtain duplicate data, the first aliquots of samples are analyzed early in the run. The second aliquots are analyzed later in the same run. In addition, calibration standards and blanks are analyzed periodically throughout the day to control sensitivity and baseline drift respectively.

Calibration Control

The calibration is controlled by a minimum of two control standards and a long term blank which are made up and maintained independently of the calibration standards. The system is not calibrated with these solutions. The long term blank is deionized, distilled water and any reagent chemicals used in the pretreatment of samples. Control standards are prepared less frequently than calibration standards and errors in calibration standards can be detected. Overlapping analysis on new solutions of control standards assure that errors in their preparation are detected.

When the control standards are analyzed, their sum and difference are plotted, versus time, on a chart and used immediately to determine whether the calibration process is in control. The control limits, against which the daily values are compared, are determined from previous data. In general, the daily values are allowed to vary by $\pm 4.5 S_{A-B}$ and $\pm 3 S_{A-B}$ for the sum and difference respectively. If either the sum or the difference is out of control, the system is stopped, corrective action taken and the control samples are re-analyzed. This cycle is repeated until the system is brought within control limits.

The actual values of the control standards are examined whenever their sums or differences are out of control. The standard deviations of the control standards are used to estimate the between run standard deviation (S) and the within run standard deviation (S_w). Values for S and S_w are calculated as follows:

$$2S_w^2 = (S_{A-B})^2$$

$$2S^2 = (S_A)^2 + (S_B)^2$$

Where

S_A = standard deviation of control sample A

S_B = standard deviation of control sample B

S_{A-B} = standard deviation of difference for
control samples A and B

N.B. If a second range is employed for one test, more control standards are used because, in many systems, the between run standard deviation may be concentration dependent.

For a detailed description of the control standard process, refer to references 1, 2, 3 and 4 in the bibliography.

Recovery Checks

In methods where sample preparation, such as digestion or extraction, is required, a recovery check, suitable to that system, is required to estimate the efficiency of the pretreatment. Recovery standards are usually prepared at 0, 20 and 80% of full scale. The solutions are analyzed daily in the same manner as routine samples. Although these solutions are not used to calibrate the instrument, corrections for the blank and matrix effects are estimated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm 5\% + T/2$ of their expected values. (T is set as a multiple of the minimum measurable response level W) The average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

Sensitivity Checks

Any change in the sensitivity of the instrumentation, over the period of analysis, is monitored by analyzing samples of a high standard periodically and comparing the peak height to the original calibration standards. Baseline drift is also recorded by periodic analysis of samples which do not contain any of the analyte. In most cases, this is deionized, distilled water but the matrix may be adjusted to correspond to sample pretreatment. The baseline should not drift more than 5% of full scale over the course of the entire run. Sensitivity changes within the 5% limits can be corrected mathematically. The frequency of these check samples is determined from historical data for each analytical system.

Interference Checks

Interference checks are run on any test where a material may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards, to minimize the interferences, are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked checks are not performed on a routine basis.

Duplicate Data

Natural samples are selected for non-adjacent, within-run duplicate analysis. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within a short period of time, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

For this performance report, the observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is then calculated for each of these spans. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev.

$$S_1 = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n-1}}$$

Std. Dev. of Duplicates

$$S_2 = \sqrt{\frac{\sum_{i=1}^n (x_1 - x_2)_i^2}{2n}}$$

Where

S_1 = sample standard deviation
 S_2 = duplicate difference standard deviation
 n = number of data
 $\bar{x}$ = mean of data
 x_i = i^{th} result
 $(x_1 - x_2)_i$ = difference of the i^{th} duplicate

Note: for std. dev. of duplicates n is the number of duplicate pairs.

FORMAT FOR PERFORMANCE REPORT

The types of samples analyzed in the Water Quality Section include ground water, surface water, sewage, industrial waste, leachates, soils, soil extract, drinking water and precipitation. The Laboratory Information System (LIS) is a centralized computer system which routes samples to a specific workstation and receives results to format into reports.

There is a performance report for each test. Information is provided to assist the reader in identifying the data which is appropriate to the various sample types and classes. The performance reports consist of a general summary sheet for each parameter, followed by one or more sheets of tabulated data and a plot of control standards, recovery checks and duplicate results, where applicable. The remainder of this section outlines the type of information which is included in the individual performance reports.

SUMMARY SHEET

TITLE:

The name of the parameter in the summary.

IDENTIFICATION:

Laboratory:	Where the test is performed on the sample types listed.
LIS Test Name Code:	LIS code used to request analysis.
Workstation Code:	LIS code for workstation where sample is routed.
Method Code:	LIS code for the analytical procedure.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Units in which the results are reported.
Unit Code:	LIS code for the units.
Supervisor:	Supervisor responsible for the laboratory.
Sample Type/Matrix:	The various sample types that can be routed to the workstation.

SAMPLING:

A brief description of the type of bottle to use, preservatives (if applicable) and minimum volume of sample required. Any sample preparation, which must be performed in the field, is also given.

SAMPLE PREPARATION:

Sample preparation techniques which must be performed at the laboratory before analysis.

ANALYTICAL PROCEDURE:

A brief description of the analytical method used to test for the parameter. For detailed method descriptions, refer to reference 4 in the bibliography.

INSTRUMENTATION:

Instrumentation, used to perform the test, is given. A detailed description can be found in reference 5. Reference to automated continuous flow systems consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Use of microcomputers, to control operation of analytical equipment and/or data acquisition, is identified.

REPORTING:

The maximum number of significant figures used to report the result. The calculated W value is reported when no detectable response of the instrumentation is observed. Results, which are less than the T value, are indicated by the <T remark. For a further explanation of the W and T significance, refer to appendix A.

CALIBRATION:

The number of different standards used to calibrate the analytical system daily.

CONTROLS:

The calibration control, recovery control and drift control standards, that are used, to ensure the proper operation of the system and may include the frequency of analysis.

MODIFICATIONS:

Modifications to the test since the publication of "*Handbook of Analytical Methods for Environmental Samples*" (HAMES) (reference 5).

NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

PERFORMANCE DATA

For each performance report, there will be at least one tabulated data page.

TITLE:

The name of the parameter.

QUALITY CONTROL DATA FROM/TO:

The dates of the collection period for the data.

LAB:

The laboratory in which the data were collected.

ANALYTICAL RANGE:

The full scale value for the analytical range is given in concentration units.

CALIBRATION CONTROL:

A table for the calibration control standards. The within run standard deviation (S_w), the between run standard deviation (S), the ratio S/S_w and the ranges for acceptance of the A+B and A-B values are shown.

RECOVERIES:

A table for the recovery control standards.

DUPLICATES:

A table for the within run data of the duplicate aliquots. The data are sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) for a particular concentration span by the mean concentration of duplicate results in that span and multiplying by 100.

OTHER CHECKS:

Data for any other checks which may be used.

QUALITY CONTROL GRAPHS

For each data page there is one quality control graph page.

TITLE:

The name of the parameter and appropriate units.

DATE FROM/TO:

Dates on plot correspond to dates on performance data page.

CALIBRATION CONTROL:

Calibration control standard sums and differences are plotted on a horizontal scale for the period of data collection. the vertical scale is centred on the expected value. Control limits ($\pm CL$) were chosen from previous analytical performance when available. Frequent data outside the limits, indicate a system out of control or excessively close limits. An asterisk marks each point more than 15% outside the limits.

RECOVERY PLOTS:

Where recovery checks are performed, the highest and lowest concentrations are plotted. The horizontal scale is identical to the calibration control plots. The vertical scale is centred on the expected value.

DUPLICATE PLOTS:

All duplicate results, for the period, are summarized in a three segment plot. Each segment is a portion of the full scale calibration. These segments may not correspond to the spans listed in the PERFORMANCE DATA page. In each concentration category, the absolute differences between duplicate samples are grouped to determine their frequency. The relative number of occurrences, in each range, are plotted as a percentage of the total in three frequency histograms. As the histogram ranges are calculated with respect to full scale, they cover the same span of absolute differences in concentration for each of the graphs, and the distribution can, therefore, be compared directly.

**MICROBIOLOGICAL
QUALITY CONTROL**

MICROBIOLOGICAL QUALITY CONTROL

Analyses on microbiological samples for bacteria indicative of pollution require the careful uses of methods and techniques by technicians to ensure that no extraneous contamination is accidentally introduced into the analytical procedure to produce either false positive or false negative results. Checks are made to determine that the analytical procedures are functioning properly and providing the client with results that are both accurate and reproducible within the limits of normal statistical variation. To this end, a series of quality control tests are conducted on a regular basis and their results are monitored so that any irregularities in the test procedures are corrected and false results are not reported.

Membrane Filter Tests (MF)

Blank Control Filters

Each sample analyzed by the membrane filter test is separated from the previous sample by introducing a control filter at the beginning of each analysis. The control filter is placed on the bacterial medium used for incubation of filters from the next sample, so that all filters are incubated under the same conditions. If any bacteria appear on the control filter, they were likely carried over from the previous sample. No target or indicator organisms and <10 non-target or background organisms should appear on the control filter. If these limits are exceeded, the senior technician or scientist should be consulted to decide whether the extent of carry-over of bacteria would materially bias the results of the next sample. If excessive bias is suspected the result will not be reported.

Duplicate Analyses

Duplicate analyses are done at a frequency of one in twenty samples. For the Drinking Water Unit both raw and treated water samples will be chosen to provide valid duplicate count results. The results for the duplicate analyses will be accumulated over time for each parameter and a within-run or between-run standard deviation will be calculated to give a measure of the reproducibility of results. On a day to day basis, duplicate counts should not vary from each other by more than a factor of three.

Media Quality Control

A number of checks are made both during and after the preparation of a batch of medium. The pH of a medium is monitored after all the ingredients have been added and again after sterilization has taken place. The final pH should not vary by more than 0.2 units from the recommended value. The medium is checked for sterility at both 20 C and 35 C by incubating random samples of either tubes or plated depending on how the medium is dispensed. Any bacterial growth will require retesting of the medium for sterility. Confirmation of contamination will result in the rejection of the medium for any further use. The batch or lot number of a medium is recorded to determine if any changes in quality occur when batch or lot numbers change.

Differential agar media used in the detection and enumeration of indicator bacteria are tested to ensure their proper functioning. The medium is streaked with both a known target organism or positive culture and a known non-target organism or negative culture. If the medium is functioning properly, growth of the target organism will be abundant after 24 to 48 hours and growth of the non-target organism will not occur or will be minimal even after 72 hours of incubation. The results of all such tests are recorded and any deviations from the expected results will require retesting or rejection of the medium.

A quantitative QC test of agar media for membrane filter tests involves making up dilute suspensions of the positive and negative cultures. Selected dilutions of these suspensions are passed through membrane filters, which are then placed on plates of both the inhibitory or selective medium and plates of a non-inhibitory or non-selective medium, such as Brain Heart Infusion agar. The positive culture should form approximately the same number of colonies on the selective and non-selective media plates, whereas the negative culture should only form colonies on the non-selective medium. Results are recorded and statistically analyzed in a manner similar to that for duplicate analyses.

Presence-Absence (P-A) Tests

Blank Control P-A Bottles

For each group of 21 samples, a blank control is prepared by pouring a 99 mL dilution blank into a P-A bottle and incubating it along with the regular P-A bottles. The P-A blank bottle is incubated for four to five days and should remain free of any bacterial growth or colour change. Usually several blank control bottles are prepared each day. Growth in more than one P-A blank control test will require rechecking of the sterility of the dilution blanks and P-A medium.

Media Quality Control

A number of checks are performed on the P-A broth itself including the pH (6.8) and sterility at 20 C and 35 C and growth reaction of *Escherichia coli* (*E. coli*). If the medium is functioning properly, *E. coli* will produce a strong acid reaction (yellow colour in the medium) and agitation of the bottle will cause release of the dissolved gas in the medium producing a layer of foam at its surface.

In addition, a quantitative test of the P-A broth is done by pipetting 2 mL of broth onto a filter pad and filtering a suspension of *E. coli* through a membrane filter, which is then placed on the filter pad saturated with the P-A broth. A second MF is prepared with a similar volume of an *E. coli* suspension and placed on Brain Heart Infusion agar in a petri dish. Previous testing has shown that *E. coli* colony counts on both filters should be approximately the same. Quality Control checks on EC broth, Lactose Purple broth, MacConkey agar, Nutrient Gelatin Yeast Extract agar and Mannitol Salt agar include pH readings, sterility and bacterial growth reactions of positive and negative cultures inoculated onto or into each medium. If any Quality Control tests fail, the medium is either retested or rejected.

Age of Samples

The accurate determination of bacterial numbers for indicator or heterotrophic bacteria in a sample depends on how quickly the sample can be transported to the laboratory for analysis. Water samples should be kept as closely as possible to the original water temperature by using a foam-packed container, which includes a central plastic bottle containing water that has been frozen, or by cooling to refrigeration temperatures before shipment to the laboratory.

Samples should arrive at the laboratory on the same day as sampled or, if refrigerated, within 24 hours. For sewage effluent and surface water samples, no analysis will be done if the samples are older than 48 hours; for drinking water samples, the time limit is 72 hours, and for legal samples, it is 24 hours. Limits on the age of samples for analysis must be in place as bacterial numbers in samples may increase or decrease depending on nutrients, toxic elements and the influence of temperature on the metabolic activities of the organisms. The longer the time period between sampling and analysis, the greater the chance for producing either inflated or deflated numbers of organisms per 100 mL of sample.

*****ACID AMMONIUM OXALATE EXTRACTABLE(Fe,Al,Mn,Si)*****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 1986
LIS Test Name Code	: FE/,AL/,MN/,SI/(EOX)	Units	: %as Fe,Al,Mn,Si
Work Station Code	: DOMETOX	Unit Code	: 070826,
		070813, 070825, 070814	
Method Code	: 302AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 gm air dried, sieved to <2mm, then ground to <500
(ground to <150 um for baseline samples).

Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are weighed into disposable tubes. 10 mL of acid ammonium oxalate extractant is added and the tubes are capped and shaken for 4 hours in the dark. Samples are then centrifuged and the analysis is performed on the supernatant.

INSTRUMENTATION:

Varian AA 1275 .

REPORTING:

Maximum Significant Figures: 2,2,2,3 Current W value:0.01,0.01,0.01,0.001 T value:
0.05,0.05,0.05,0.005

CONTROLS:

Calibration : 6 Standards covering the following ranges; 0-2.00 Fe, 0-2.00 Al, 0-0.25 Si, and 0-0.10 Mn.

Other Controls: Three long term soil samples and 2 method blanks are run with each set.

MODIFICATIONS:

1986 - disposable tubes are used and the tubes are wrapped in foil.

Acid Ammonium Oxalate ext. Iron
QUALITY CONTROL DATA FROM 26/01/87 TO 25/08/87

Lab: Dorset Soils

Analytical Range: 0.03 to 1.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.75	N/A	N/A	N/A
b :	0	0.25	N/A	N/A	N/A
a+b :	0	1.00	N/A	N/A	N/A
a-b :	0	0.50	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.85 to 1.15 for A+B
0.40 to 0.60 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	5	0.76	0.76	0.050
r2 :	5	0.39	0.39	0.007
r3 :	5	0.49	0.52	0.080

DUPLICATES:

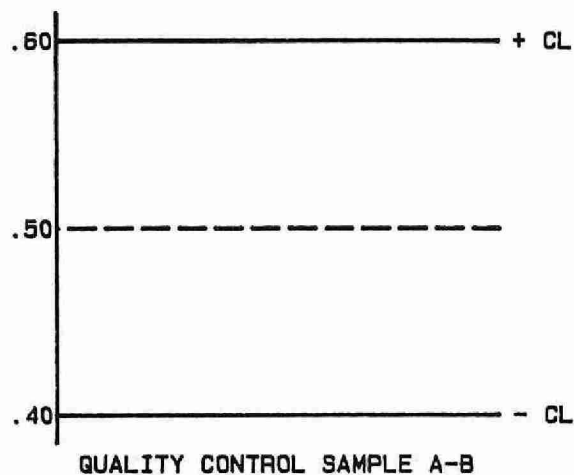
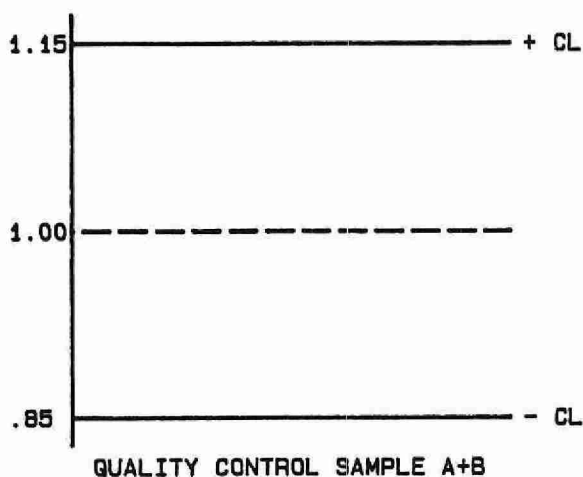
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	2	0.00 - 0.20	0.005	2.8
	8	0.20 - 0.50	0.046	14.1
	9	0.50 - 1.00	0.015	2.1
	18	Overall	0.031	N/A

OTHER CHECKS:

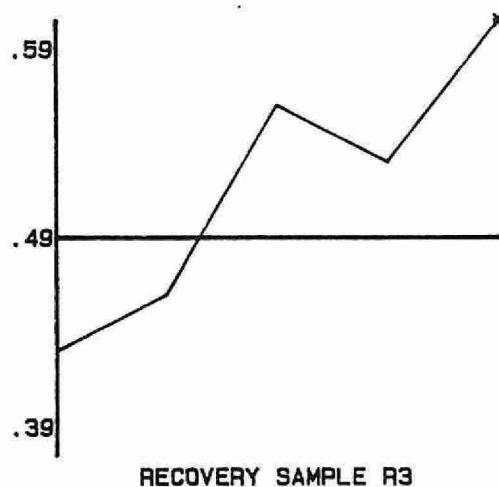
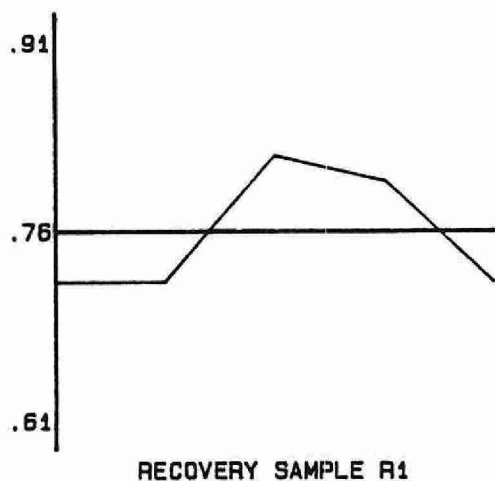
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	5	0.00	0.000

QUALITY CONTROL GRAPHS ACID AMMONIUM OXALATE EXT. IRON (% AS FE)

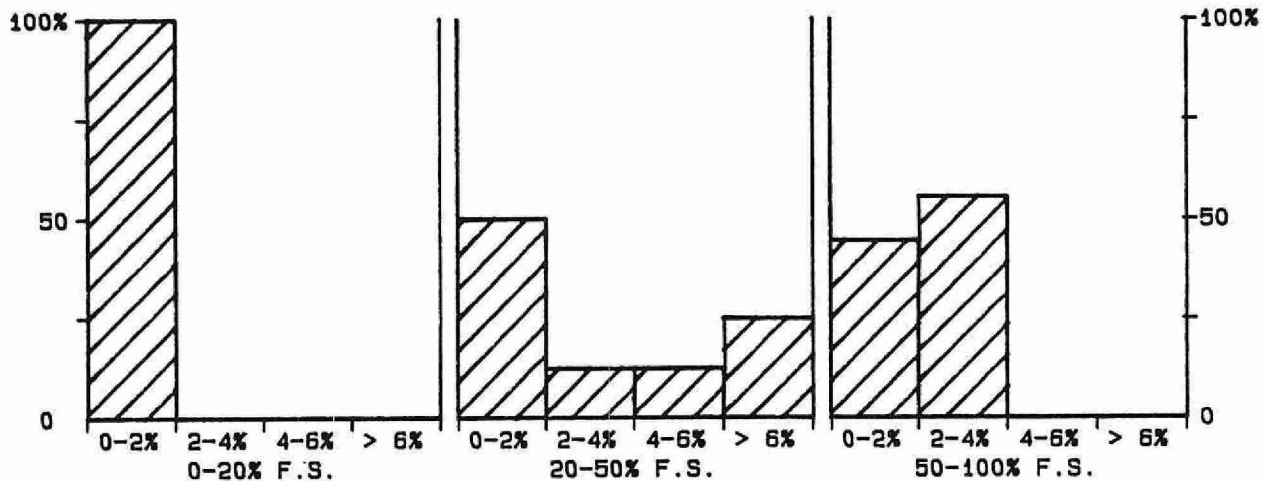
FROM: 26/01/87
TO: 25/08/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



Acid Ammonium Oxalate ext. Aluminum
QUALITY CONTROL DATA FROM 27/01/87 TO 25/08/87

Lab: Dorset Soils

Analytical Range: 0.05 to 1.00 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.75	N/A	N/A	N/A
b :	0	0.25	N/A	N/A	N/A
a+b :	0	1.00	N/A	N/A	N/A
a-b :	0	0.50	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.85 to 1.15 for A+B
0.40 to 0.60 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	5	1.18	1.20	0.073
r2 :	5	0.19	0.19	0.015
r3 :	5	0.15	0.16	0.047

DUPLICATES:

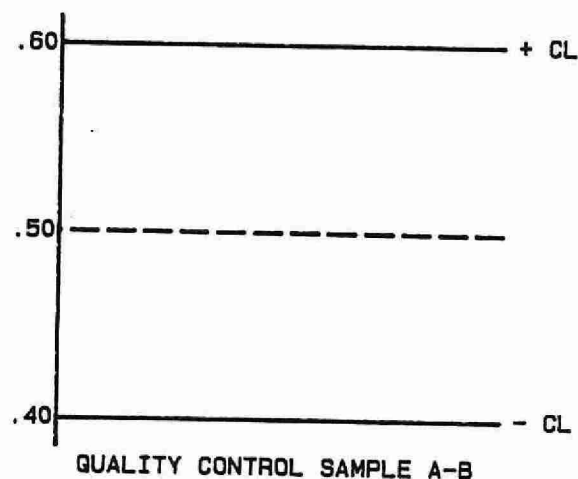
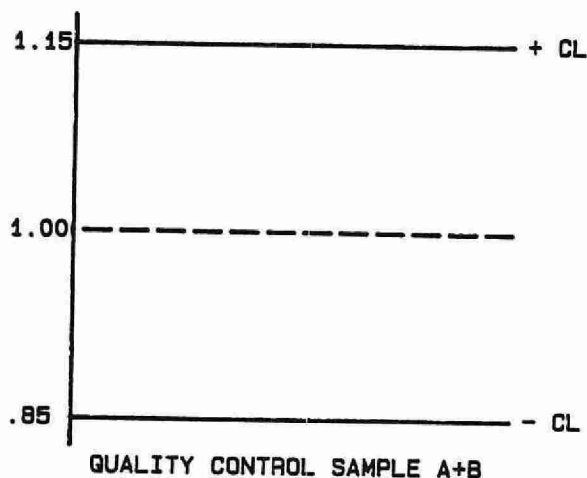
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.00 - 0.20	0.009	7.3
3	0.20 - 0.50	0.013	3.9
8	0.50 - 1.00	0.013	1.8
19	Overall	0.011	N/A

OTHER CHECKS:

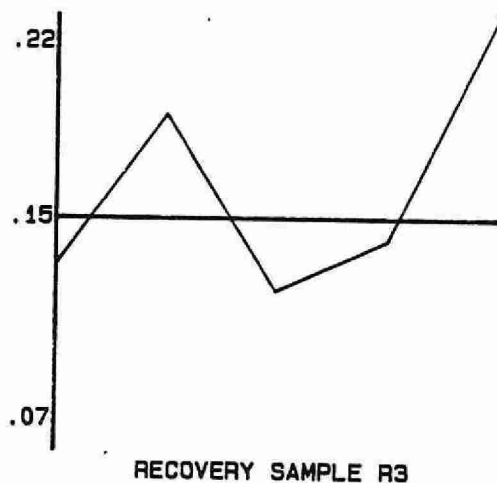
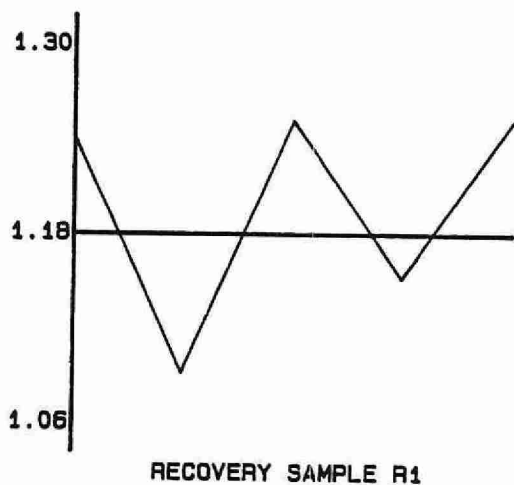
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	5	0.00	0.000

QUALITY CONTROL GRAPHS ACID AMMONIUM OXALATE EXT. ALUMINUM (% AS AL)

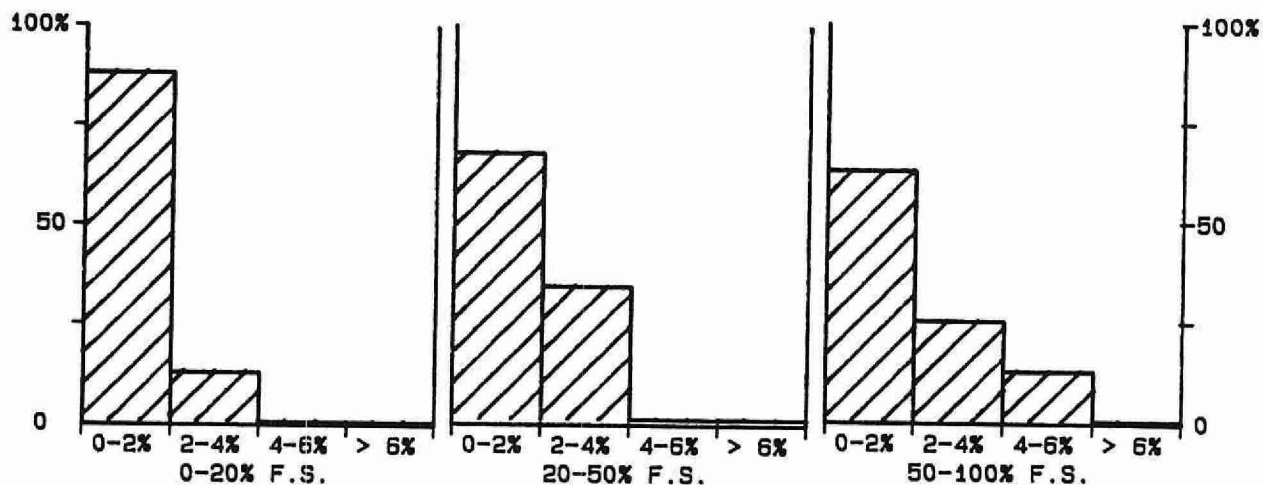
FROM: 27/01/87
TO: 25/08/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



Acid Ammonium Oxalate ext. Manganese
QUALITY CONTROL DATA FROM 31/01/87 TO 25/08/87

Lab: Dorset Soils

Analytical Range: N/A to 0.0250 % as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.0187	N/A	N/A	N/A
b :	0	0.0063	N/A	N/A	N/A
a+b :	0	0.0250	N/A	N/A	N/A
a-b :	0	0.0125	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.0212 to 0.0287 for A+B
0.0100 to 0.0150 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	2	0.0054	1.0061	0.0012
r2 :	2	0.0506	0.0562	0.00559
r3 :	2	0.0015	1.0013	0.00057

DUPLICATES:

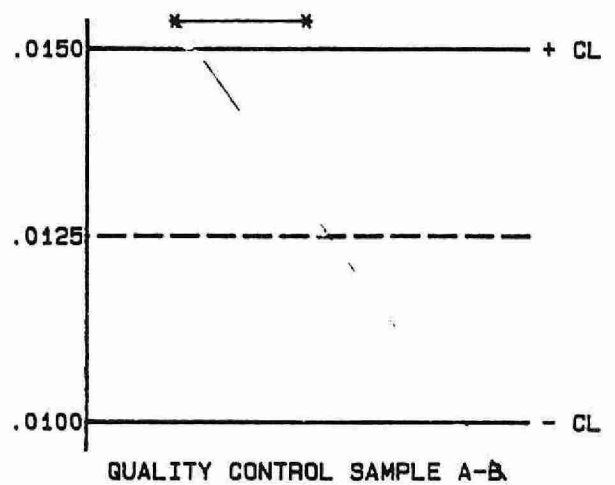
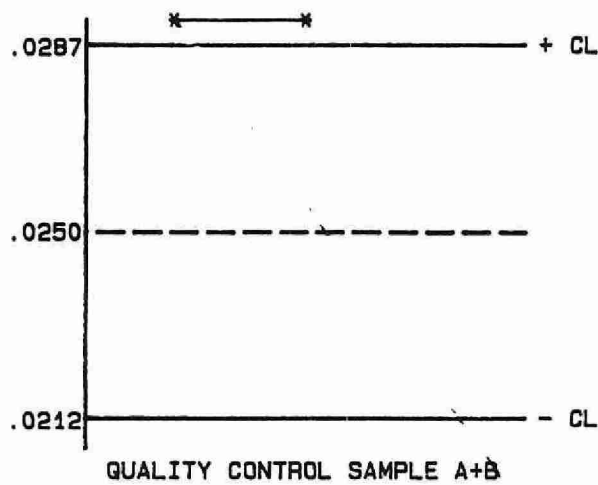
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.0000 - 0.005	N/A	N/A
0	0.005 - 0.0125	N/A	N/A
5	0.0125 - 0.0250	0.0012	7.4
5	Overall	0.0012	N/A

OTHER CHECKS:

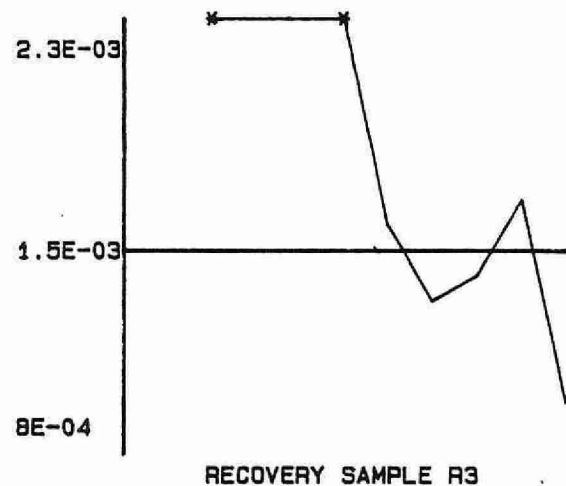
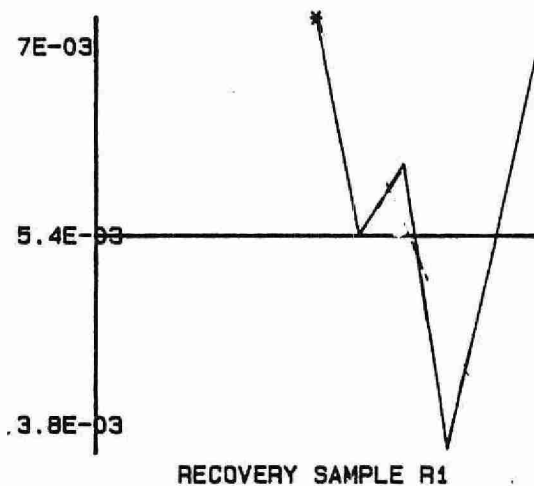
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	2	0.0000	0.00000

QUALITY CONTROL GRAPHS ACID AMMONIUM OXALATE EXT. MANGANESE (% AS MN)

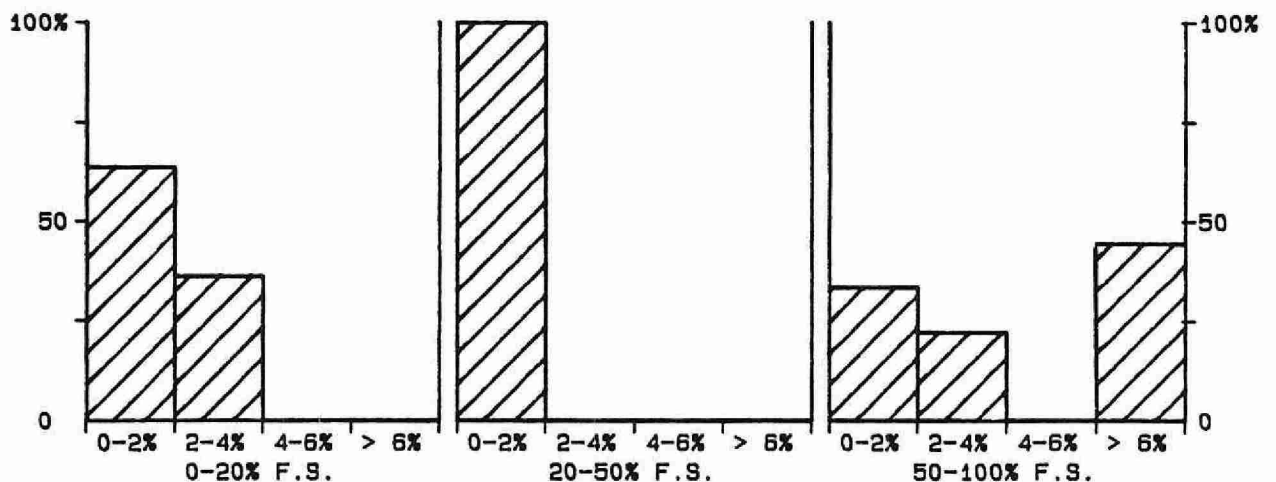
FROM: 02/01/87
TO: 25/08/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



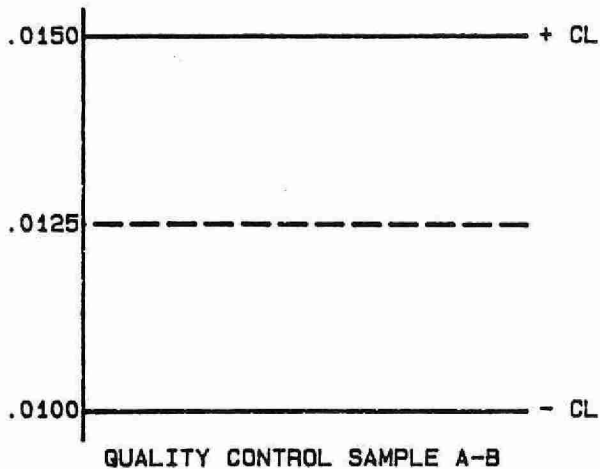
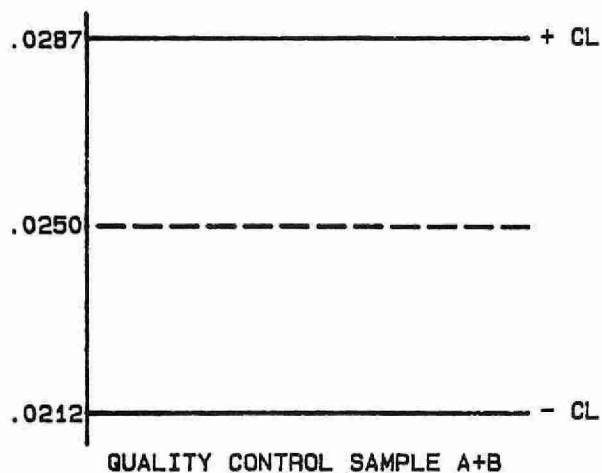
* DATA > 15% OUTSIDE CL



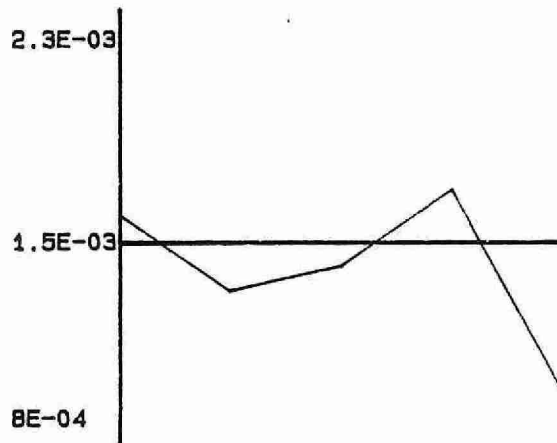
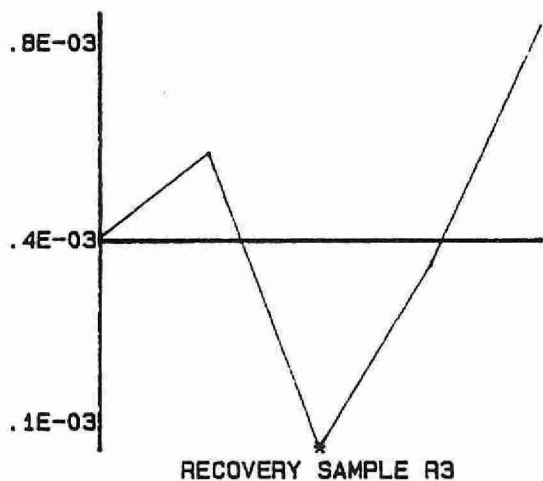
CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .025 % AS MN

QUALITY CONTROL GRAPHS ACID AMMONIUM OXALATE EXT. MANGANESE (% AS MN)

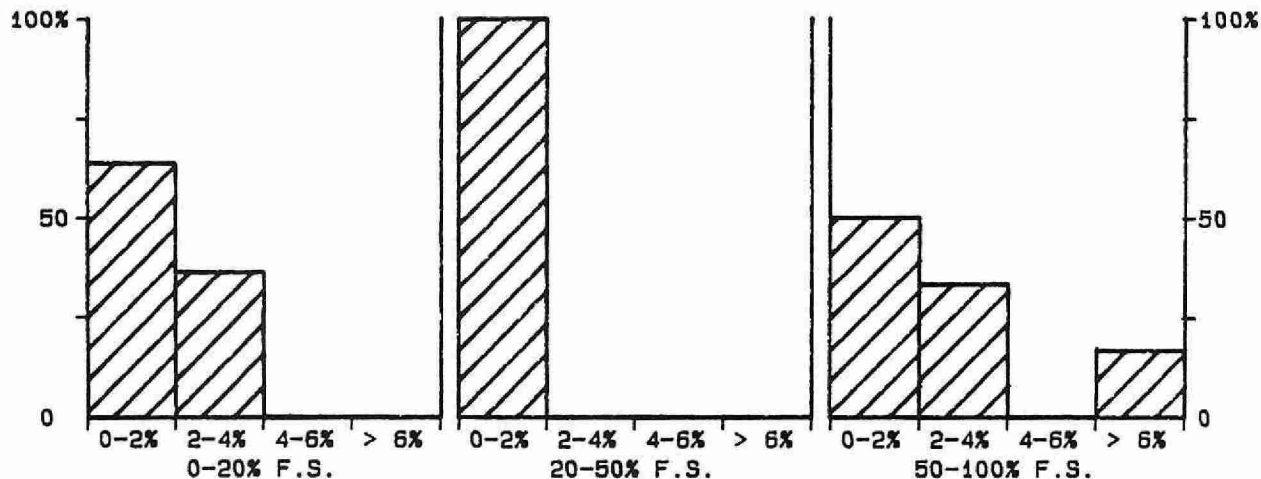
FROM: 28/01/87
TO: 25/08/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .025 % AS MN

*** ACIDITY - GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/08/82
LIS Test Name Code	: ACDG	Units	: ug/L as H
Work Station Code	: PHACD	Unit Code	: 064801
Method Code	: 001BT5	Supervisor	: P. Campbell
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene or equivalent

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01 N sodium hydroxide to a pH >8.3. The titrant is standardized against 0.0005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.
N.B. pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL (expected result is 16.6 ueq/H) plus 2 standards, e.g. QCA

MODIFICATIONS:

01/08/82 -QC program was expanded to include Gran acidity for which the reporting units are ug/L as H.
01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.
01/06/84 -Normality of KHP used to standardize the base was reduced from 0.005N to 0.0005N.
30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

ACIDITY - GRAN
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Titration

Analytical Range: 9.2 to 1000 ueq/L as H

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	92	500	503	3	7.8
b :	92	200	207	7	4.7
a+b :	92	700	709	9	11.0
a-b :	92	300	296	-4	6.8

s.d.(AB): Sw(within run): 4.8 S(between runs): 6.4 S/Sw: 1.34

On any given day the calibration is accepted if the values obtained lie within the ranges:

670 to 730 for A+B
 280 to 320 for A-B

DUPLICATES:

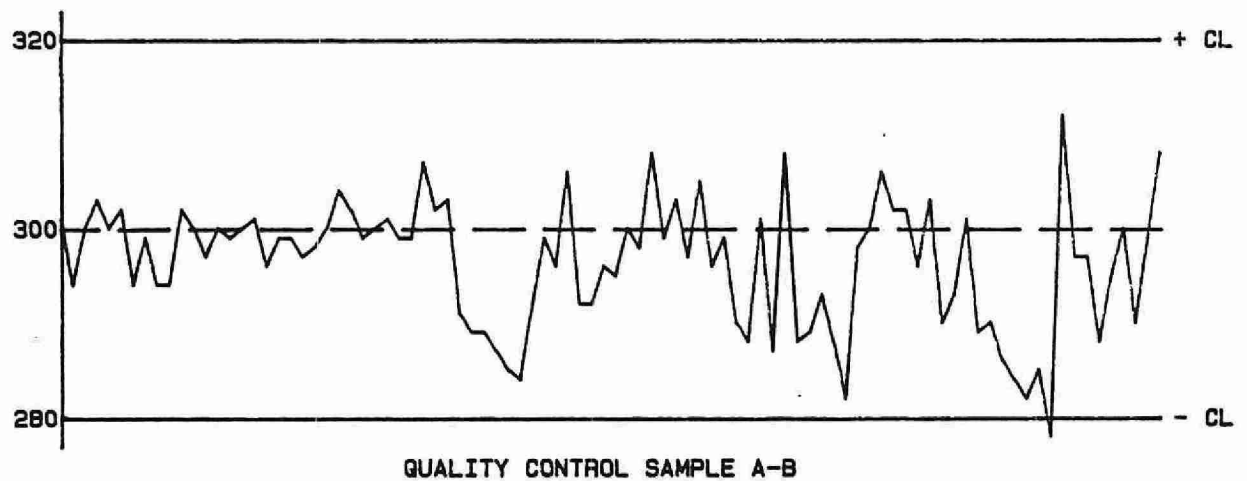
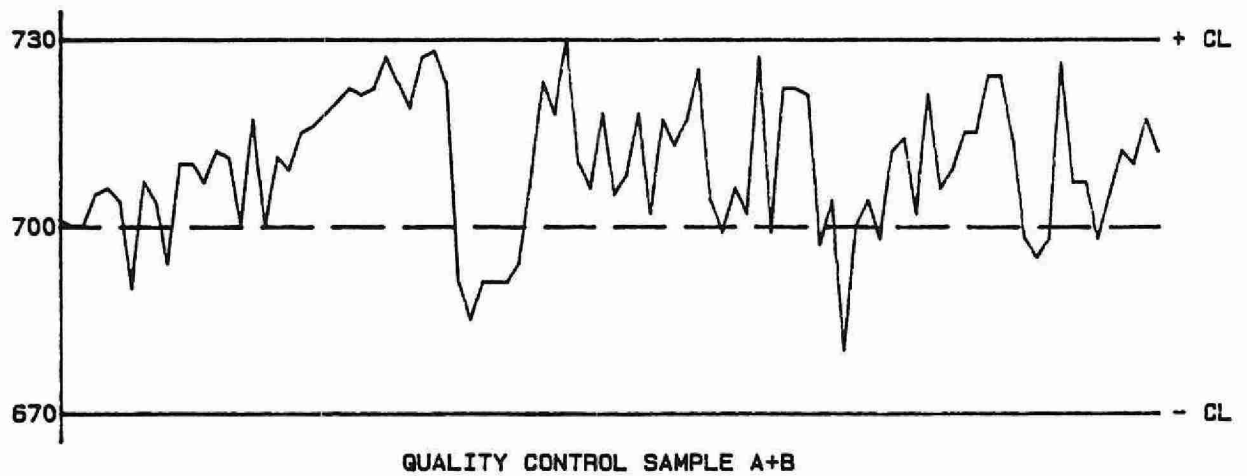
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
72	0.0 - 40.0	1.84	7.5
98	40 - 100	2.2	3.2
32	100 - 250	3.5	2.4
2	250 - 500	2.5	0.9
0	500 - 1000	N/A	N/A
204	Overall	2.3	N/A

OTHER CHECKS:

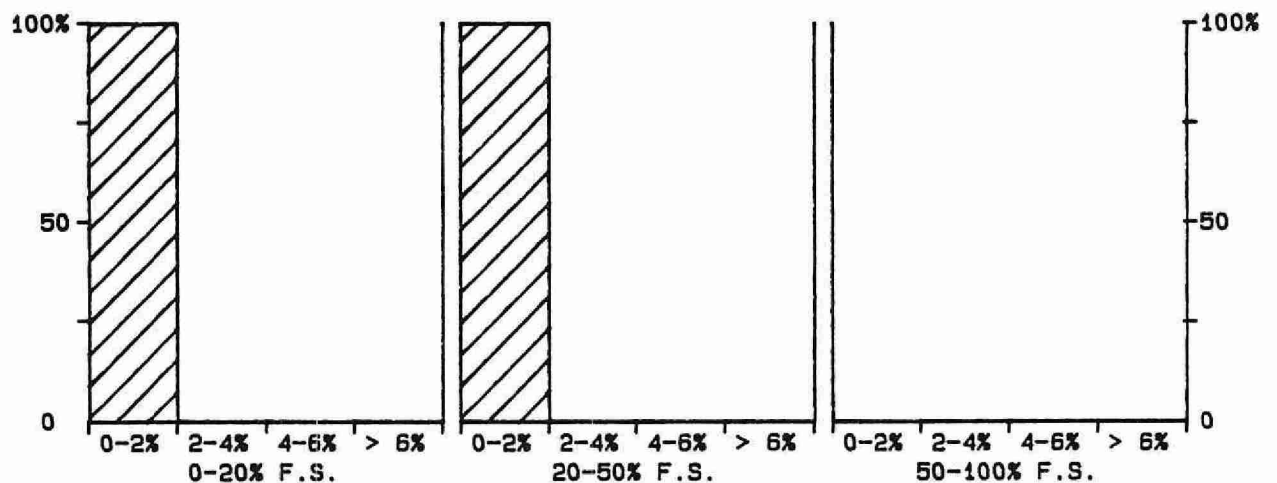
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	92	23.70	7.726

QUALITY CONTROL GRAPHS ACIDITY - GRAN (UEQ/L AS H)

FROM: 07/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 Ueq/L AS H

***** ACIDITY - TOTAL FIXED ENDPOINT (TFE) *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: P. Campbell
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes		
(by special request: Industrial Waste, Sewage)			

SAMPLING:

Quantity Required	: 15 mL
Container	: Polystyrene or equivalent

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01 N sodium hydroxide to a pH >8.3. The titrant is standardized against 0.005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant.

N.B. pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
--------------------------------	-----------------------	---------------

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration: LTBL plus 2 standards, e.g. QCA

MODIFICATIONS:

01/04/82 -Sample volume was decreased from 100.0 to 10.0 mL.

01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.

01/06/84 -Normality of KHP used to standardize the base was reduced from 0.005N to 0.0005N.

30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

ACIDITY - TOTAL FIXED ENDPOINT (TFE)
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Titration

Analytical Range: 0.45 to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	93	25.0	25.2	0.2	0.41
b :	93	10.0	10.4	0.4	0.25
a+b :	93	35.0	35.6	0.6	0.57
a-b :	93	15.0	14.8	-0.2	0.35

s.d.(AB): Sw(within run): 0.25 S(between runs): 0.34 S/Sw: 1.37

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.9 to 37.1 for A+B
 13.6 to 16.4 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	69	0.00 - 2.00	0.091	7.1
	98	2.00 - 5.00	0.106	3.1
	24	5.00 - 10.00	0.143	2.1
	10	10.0 - 25.0	0.22	1.7
	0	25.0 - 100.0	N/A	N/A
	201	Overall	0.11	N/A

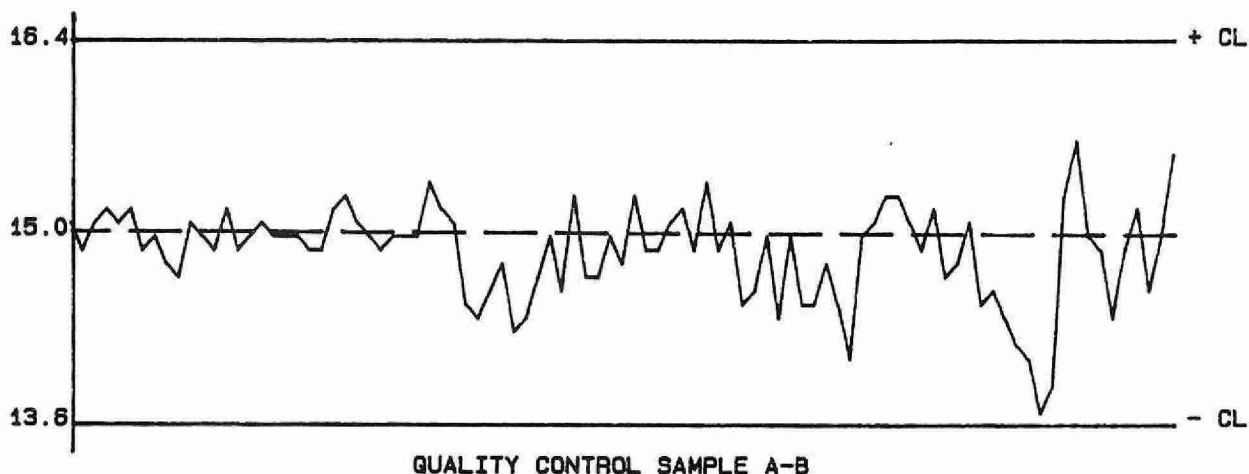
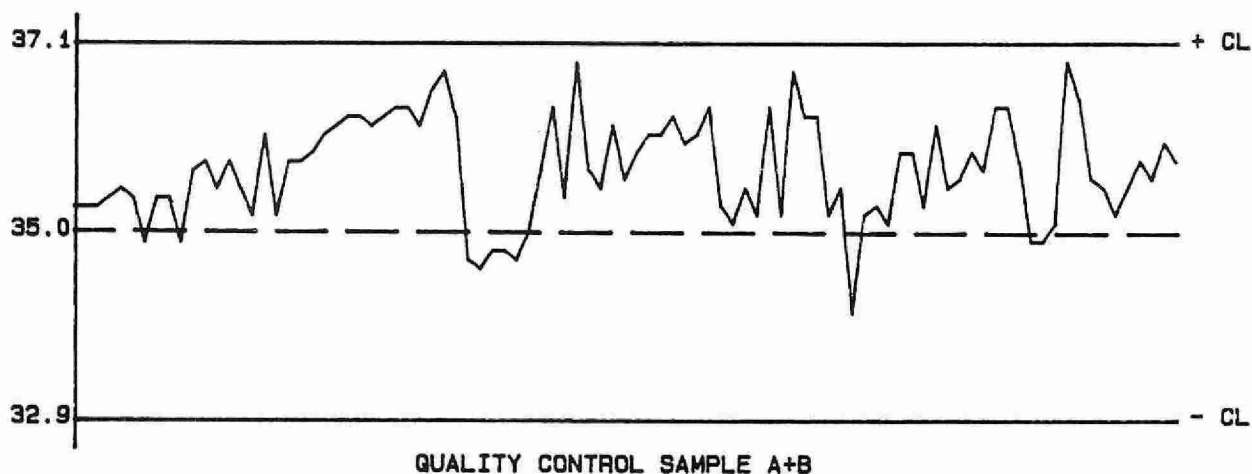
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	91	1.30	0.432

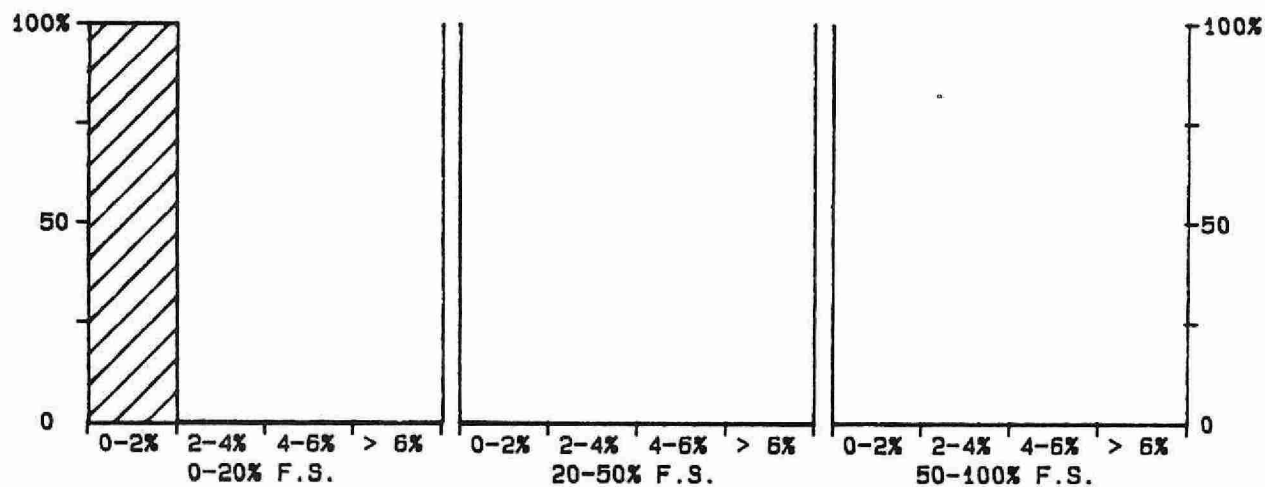
QUALITY CONTROL GRAPHS ACIDITY - TOTAL FIXED ENDPOINT (TFE) (MG/L AS CaCO_3)

FROM: 07/01/87

TO: 23/12/87



--- EXPECTED VALUE
 — CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



***** ALKALINITY - GRAN *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : Amber polyethylene bottle filled to the brim; screw caps
with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH <3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.

N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

ALKALINITY - GRAN
QUALITY CONTROL DATA FROM 02/01/87 TO 24/12/87

Lab: Dorset

Analytical Range: 0.50 to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	210	20.00	20.30	0.30	0.400
b :	209	5.00	4.88	-0.12	0.155
a+b :	209	25.00	25.19	0.19	0.470
a-b :	209	15.00	15.42	0.42	0.383

s.d.(AB): Sw(within run): 0.271 S(between runs): 0.303 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28 to 26.72 for A+B
13.85 to 16.15 for A-B

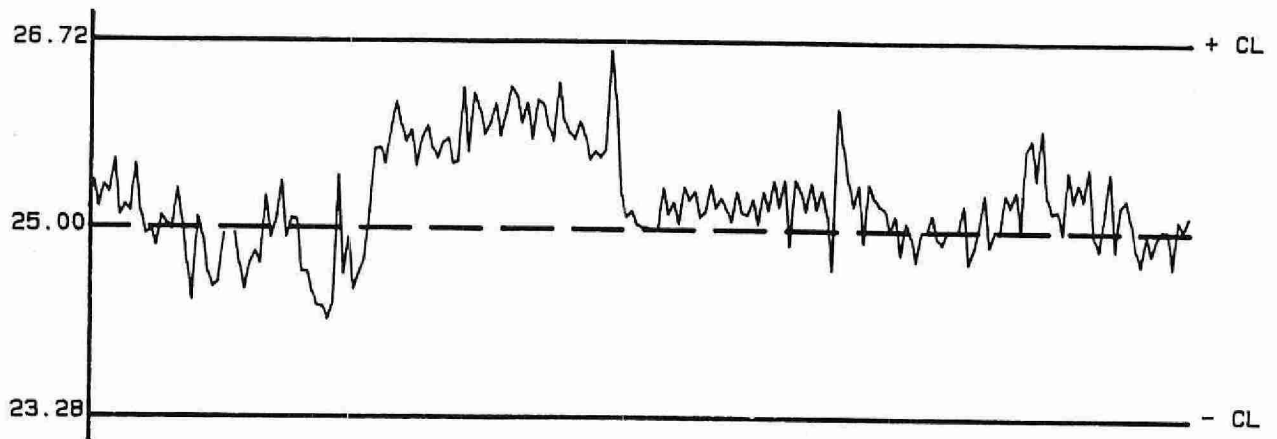
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	174	0.00 - 2.00	0.099	8.2
	278	2.00 - 5.00	0.072	2.1
	95	5.00 - 10.00	0.074	1.0
	31	10.00 - 25.00	0.067	0.4
	578	Overall	0.081	N/A

OTHER CHECKS:

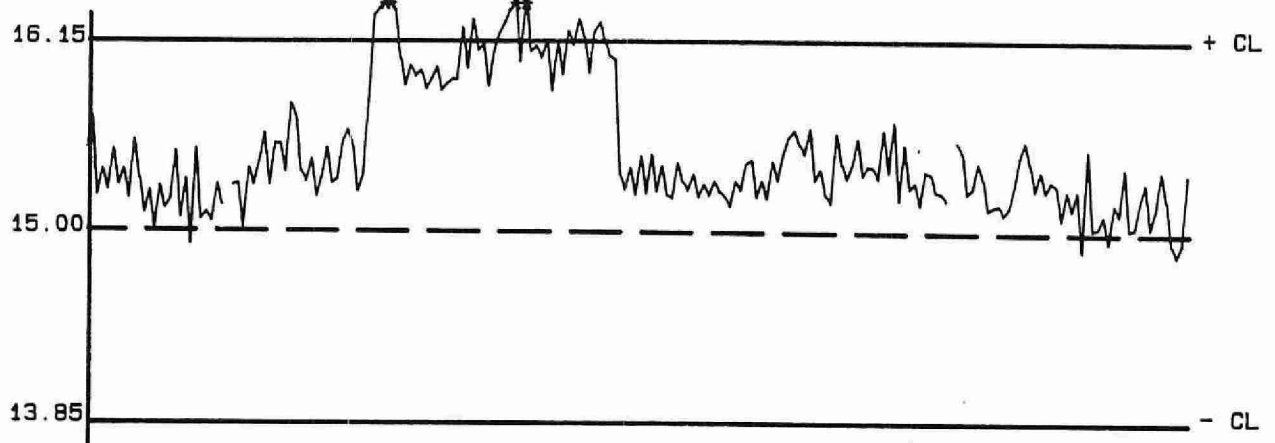
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	204	-0.32	0.153

QUALITY CONTROL GRAPHS ALKALINITY - GRAN (MG/L AS CaCO₃)

FROM: 02/01/87
TO: 24/12/87

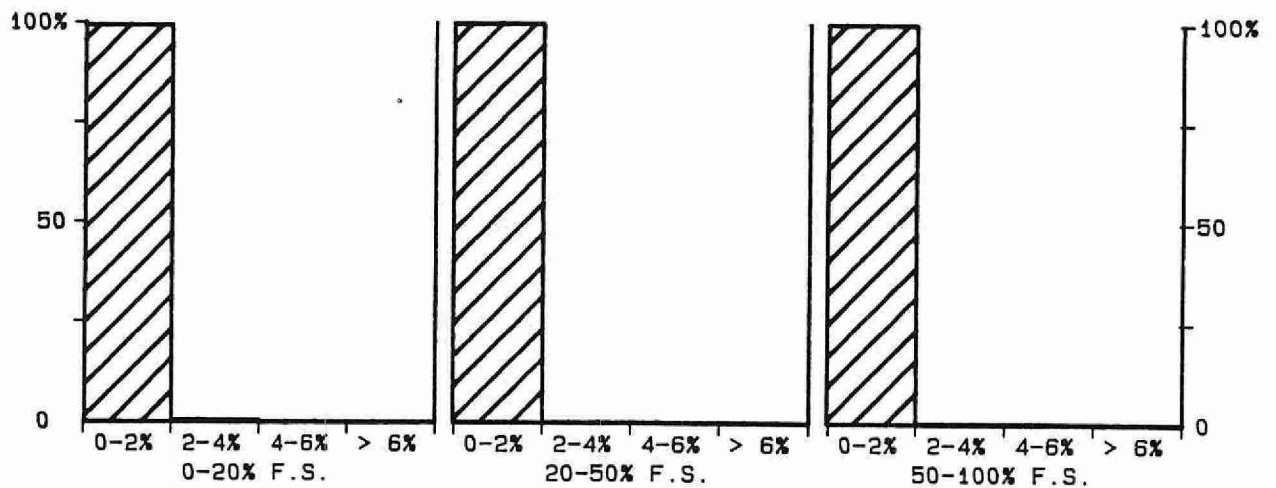


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS CaCO₃

***** ALKALINITY - GRAN *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.
N.B. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : LTBL plus two standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.
16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.
09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

ALKALINITY-GRAN
QUALITY CONTROL DATA FROM 08/01/87 TO 14/12/87

Lab: Titration

Analytical Range: N/A to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	92	10.00	9.88	-0.12	0.223
d :	92	2.50	2.46	-0.04	0.111
c+d :	92	12.50	12.34	-0.16	0.298
c-d :	92	7.50	7.42	-0.08	0.189

s.d.(CD): Sw(within run): 0.134
S/Sw: 1.32

S(between runs): 0.176

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.90 to 13.10 for C+D
7.10 to 7.90 for C-D

DUPLICATES:

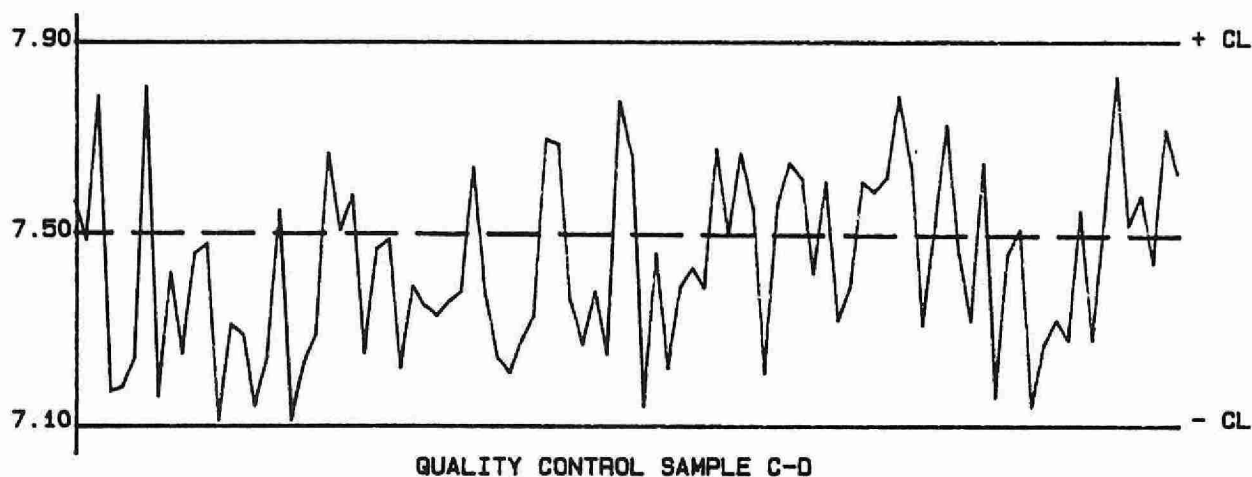
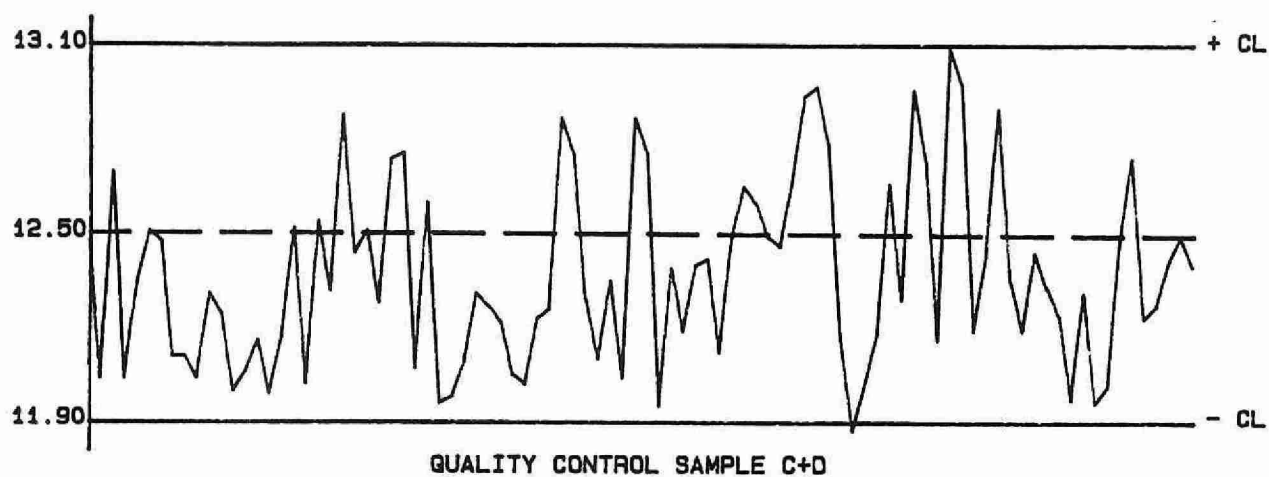
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	-2.00 - 0.00	N/A	N/A
37	0.00 - 2.00	0.106	26.3
27	2.00 - 5.00	0.307	9.8
13	5.00 - 10.00	0.255	3.2
15	10.00 - 25.00	0.322	1.9
92	Overall	0.241	N/A

OTHER CHECKS:

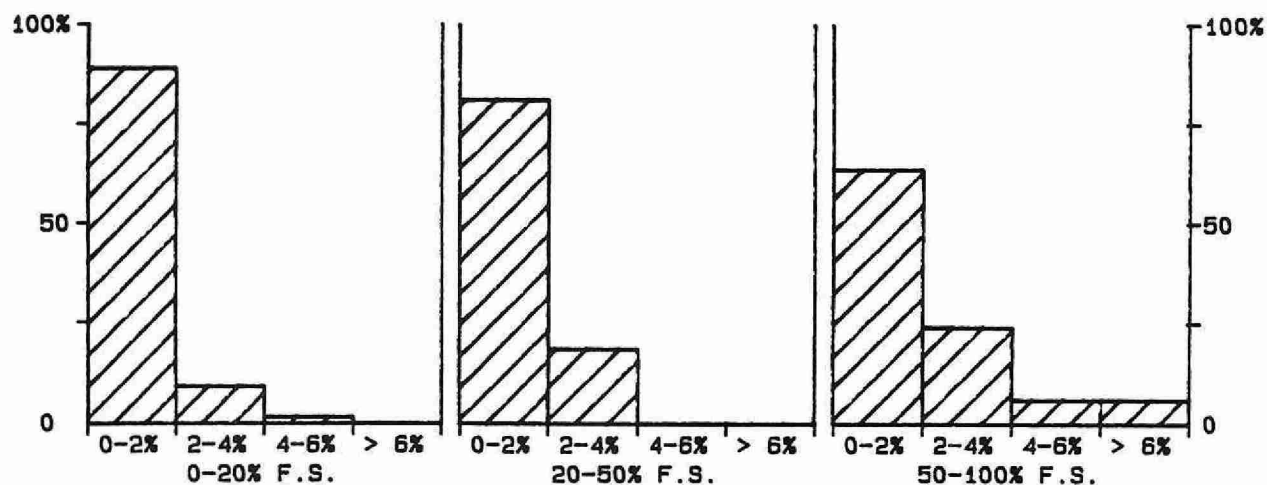
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS ALKALINITY-GRAN (MG/L AS CaCO_3)

FROM: 08/01/87
TO: 14/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS CaCO_3

***** ALKALINITY - TFE @ PH 4.5 *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

TOTAL FIXED 4.5
QUALITY CONTROL DATA FROM 02/01/87 TO 24/12/87

Lab: Dorset

Analytical Range: 0.67 to 80.00 mg/l as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	209	22.00	22.18	0.18	0.509
b :	208	6.50	6.75	0.25	0.234
a+b :	208	28.50	28.93	0.43	0.622
a-b :	208	15.50	15.43	-0.07	0.491

s.d.(AB): Sw(within run): 0.347 S(between runs): 0.396 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

26.25 to 30.75 for A+B
14.00 to 17.00 for A-B

DUPLICATES:

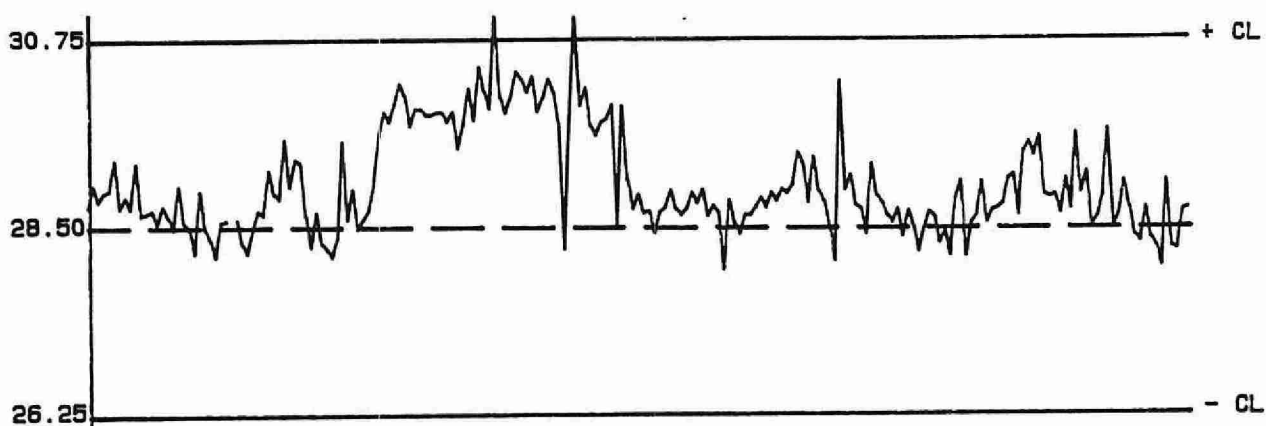
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
532	0.00 - 10.00	0.134	2.8
47	10.00 - 20.00	0.099	0.7
2	20.00 - 40.00	0.068	0.2
7	40.00 - 80.00	0.157	0.2
588	Overall	0.132	N/A

OTHER CHECKS:

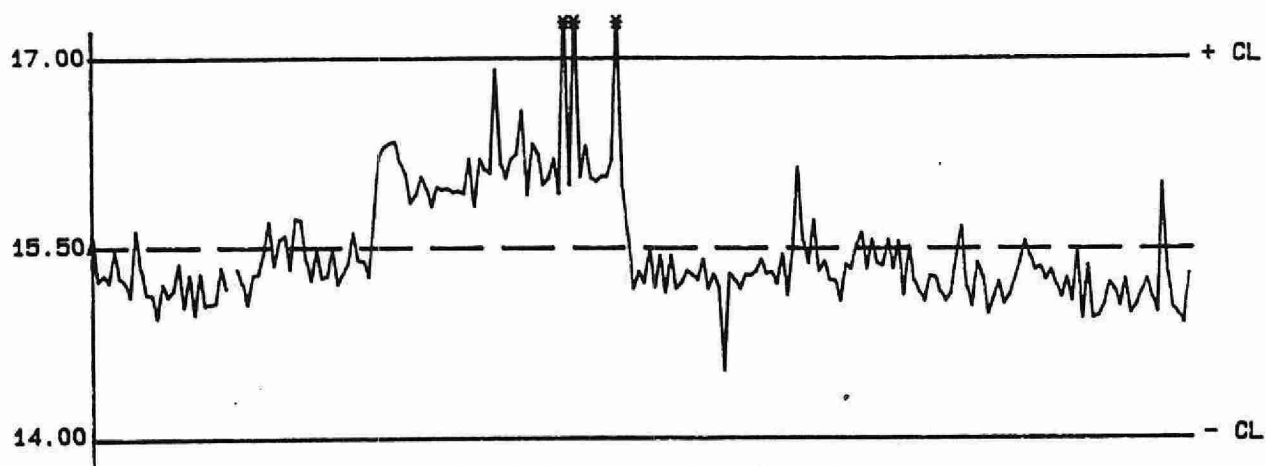
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	203	1.5	0.1

QUALITY CONTROL GRAPHS TOTAL FIXED 4.5 (MG/L AS CAC03)

FROM: 02/01/87
TO: 24/12/87

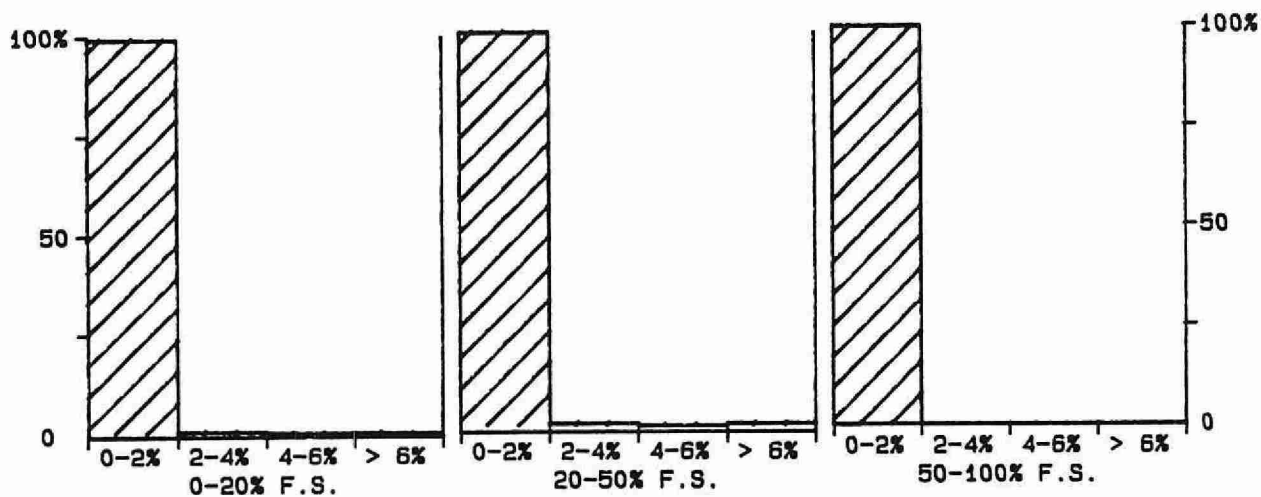


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 30 MG/L AS CAC03

***** ALKALINITY - TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required : 50 mL
Container : Polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.
N.B. pH, gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : 4 standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.
16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.
09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

ALKALINITY-TOTAL FIXED ENDPOINT
QUALITY CONTROL DATA FROM 05/01/87 TO 31/12/87

Lab: Titration

Analytical Range: 1.10 to 1000 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	159	250.0	249.7	-0.3	1.50
b :	159	50.0	49.2	-0.8	0.87
a+b :	159	300.0	298.9	-1.1	1.94
a-b :	159	200.0	200.5	0.5	1.51
c :	159	10.00	9.93	-0.07	0.234
d :	159	2.50	2.49	-0.01	0.114
c+d :	159	12.50	12.41	-0.09	0.313
c-d :	159	7.50	7.44	-0.06	0.194

s.d.(AB): Sw(within run): 1.07 S(between runs): 1.23 S/Sw: 1.15
s.d.(CD): Sw(within run): 0.137 S(between runs): 0.184 S/Sw: 1.34

On any given day the calibration is accepted if the values obtained lie within the ranges:

295.5 to 304.5 for A+B
197.0 to 203.0 for A-B
11.90 to 13.10 for C+D
7.10 to 7.90 for C-D

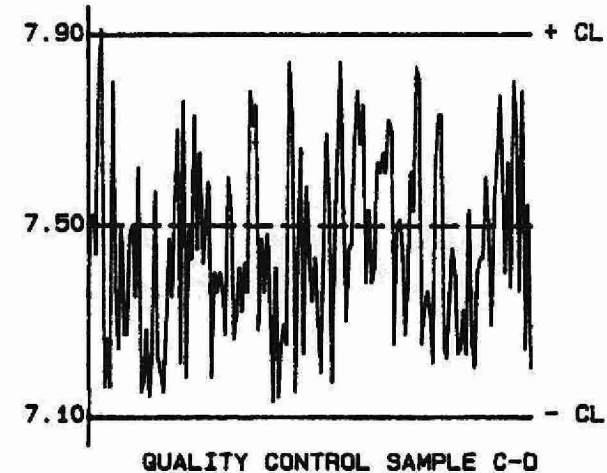
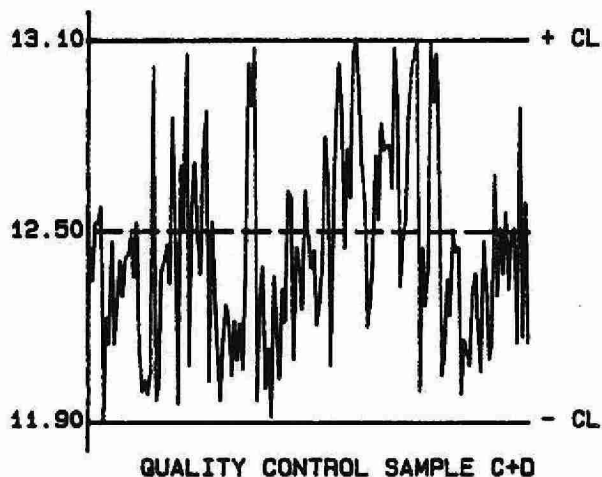
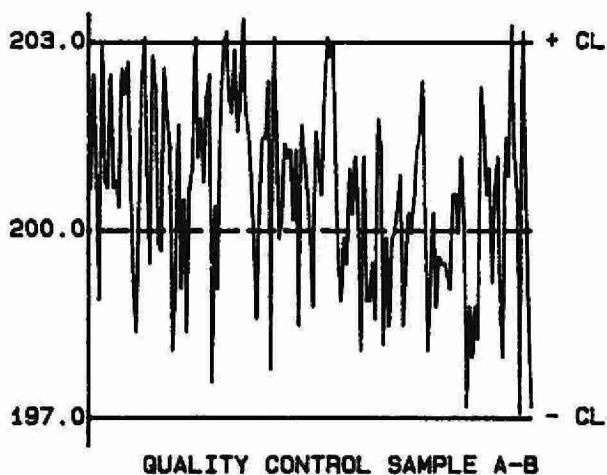
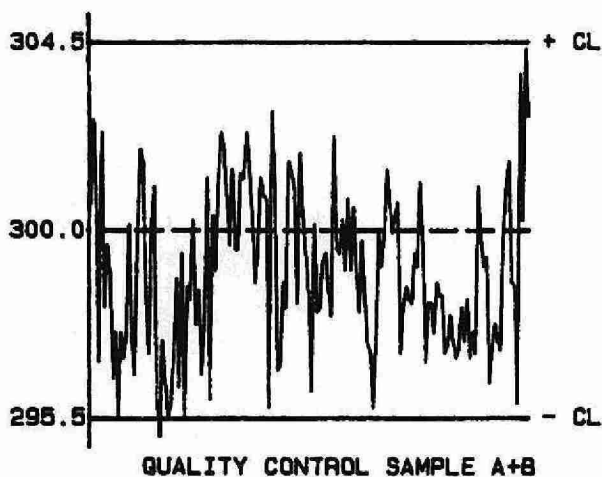
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	61	0.00 - 10.00	0.220	4.0
	36	10.00 - 25.00	0.385	2.1
	63	25.00 - 100.00	0.736	1.1
	215	100.0 - 500.0	1.08	0.5
	0	500 - 1000	N/A	N/A
	375	Overall	0.9	N/A

OTHER CHECKS:

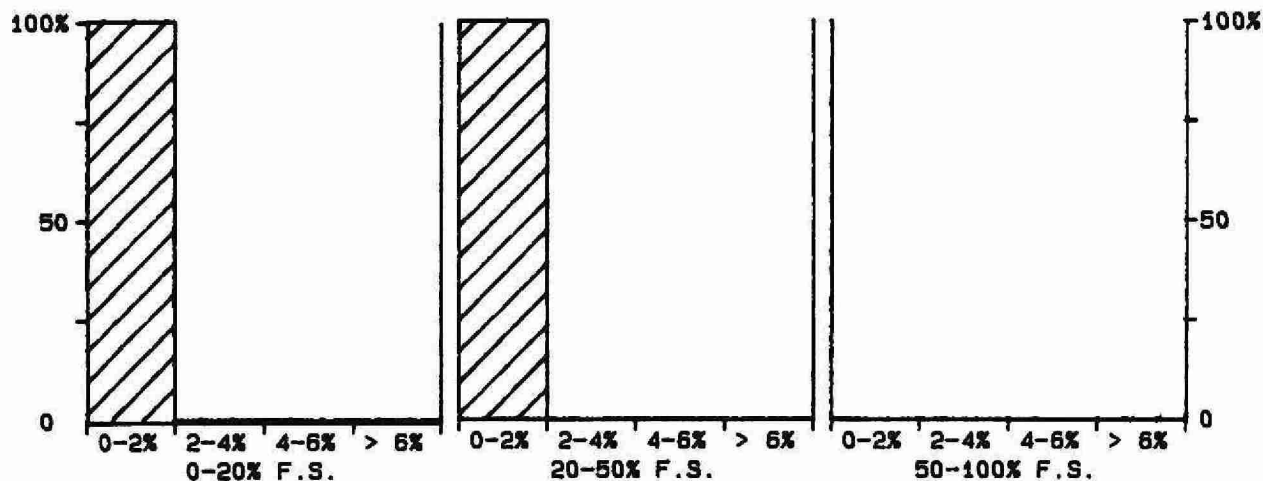
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	159	1.88	0.127

QUALITY CONTROL GRAPHS ALKALINITY-TOTAL FIXED ENDPOINT (MG/L AS CaCO₃)

FROM: 05/01/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L AS CaCO₃

*** ALKALINITY - TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: P. Campbell
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.020 N sulphuric acid to pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.
N.B. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : In run standards throughout the run (diluted tab water 50% V/V)

MODIFICATIONS:

04/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

ALKALINITY-TOTAL FIXED ENDPPOINT
QUALITY CONTROL DATA FROM 06/01/87 TO 30/12/87

Lab: Titration

Analytical Range: 0.72 to 1000.0 mg/L as CaCO3

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	250.0	248.0	-2.0	2.18
b :	114	100.0	99.9	-0.1	1.53
a+b :	114	350.0	347.9	-2.1	3.00
a-b :	114	150.0	148.1	-1.9	2.28
c :	114	100.00	99.10	-0.90	1.139
d :	114	25.00	24.60	-0.40	0.338
c+d :	114	125.00	123.70	-1.30	1.310
c-d :	114	75.00	74.50	-0.50	1.052

s.d.(AB): Sw(within run): 1.61 S(between runs): 1.88 S/Sw: 1.17
s.d.(CD): Sw(within run): 0.744 S(between runs): 0.840 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

341.9 to 358.1 for A+B
144.6 to 155.4 for A-B
117.95 to 132.05 for C+D
70.30 to 79.70 for C-D

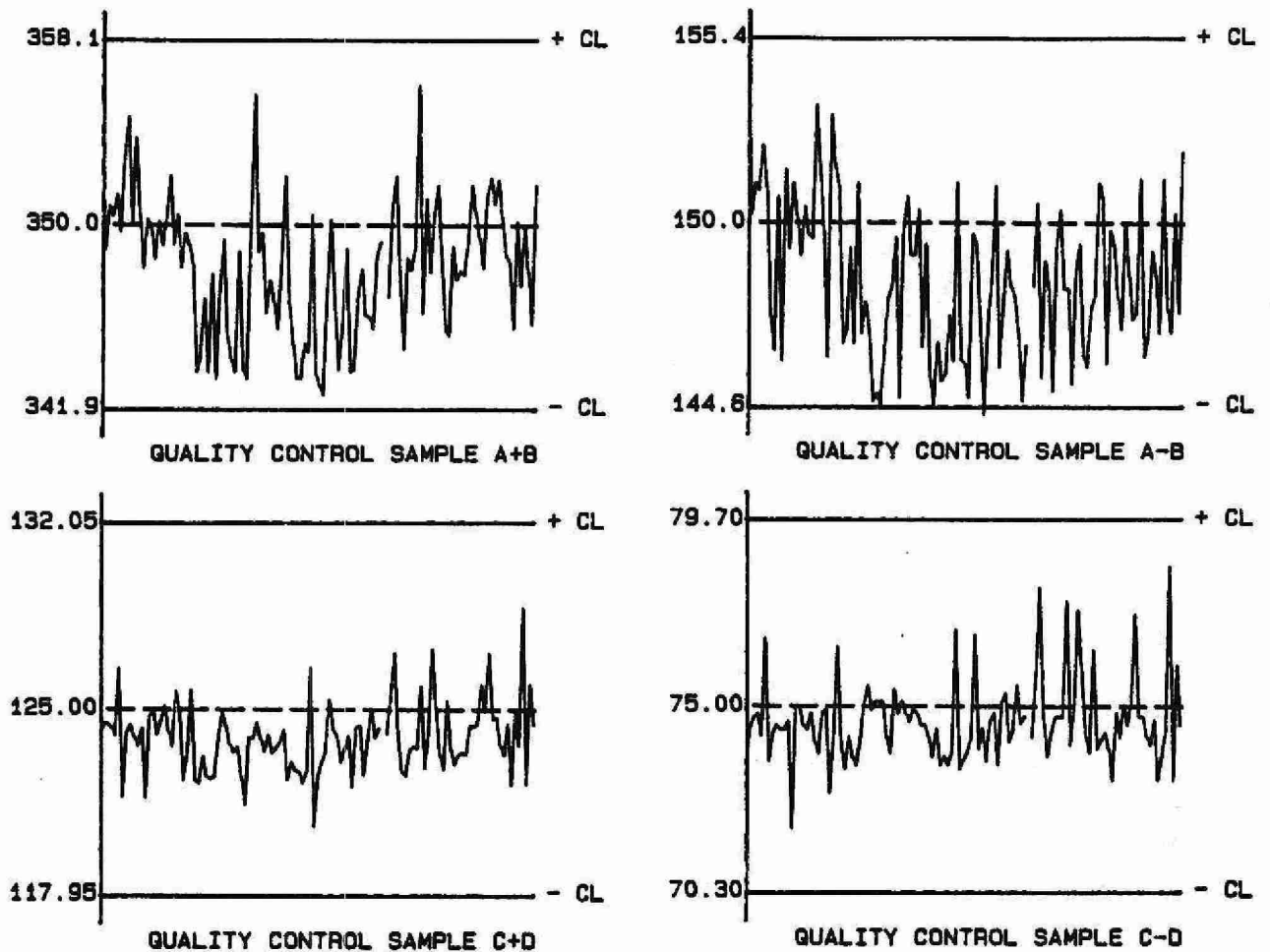
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	12	0.00 - 10.00	0.144	2.3
	23	10.00 - 25.00	0.608	3.1
	116	25.00 - 100.00	1.010	1.4
	150	100.00 - 500.00	2.287	1.0
	1	500.0 - 1000.0	N/A	N/A
	302	Overall	1.74	N/A

OTHER CHECKS:

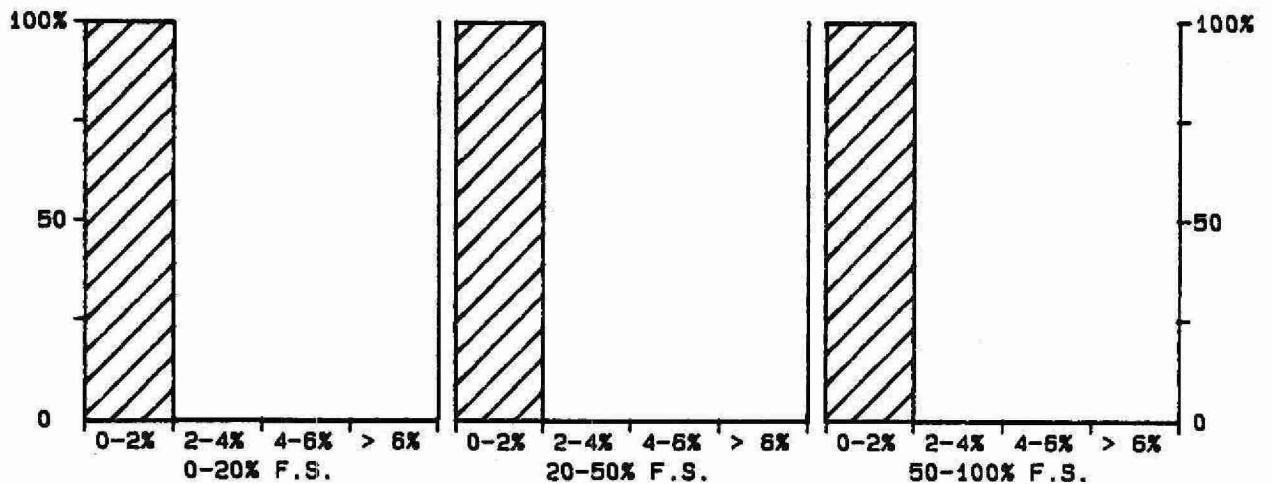
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	114	1.74	0.220

QUALITY CONTROL GRAPHS ALKALINITY-TOTAL FIXED ENDPOINT (MG/L AS CaCO₃)

FROM: 06/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L AS CaCO₃

***** ALKALINITY - TOTAL FIXED ENDPOINT *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before 1980
LIS Test Name Code	: ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WQSDIRT	Unit Code	: 064915
Method Code	: 003MT3	Supervisor	: P. Campbell
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are pipetted manually (50.0 mL) and titrated with 0.020 N sulphuric acid to pH endpoint of 4.5.

N.B. Analysis is performed on the supernatant or filtrate.

INSTRUMENTATION:

Automated modular titration system .

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA

MODIFICATIONS:

None

ALKALINITY WQSDIRT
QUALITY CONTROL DATA FROM 05/01/87 TO 23/12/87

Lab: Titration

Analytical Range: 29.5 to 750.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	144	570.0	571.7	1.7	3.97
b :	141	114.0	117.6	3.6	1.72
a+b :	141	684.0	689.4	5.4	4.76
a-b :	141	456.0	454.1	-1.9	3.90

s.d.(AB): Sw(within run): 2.76 S(between runs): 3.06 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

673.6 to 694.4 for A+B
449.1 to 462.9 for A-B

DUPLICATES:

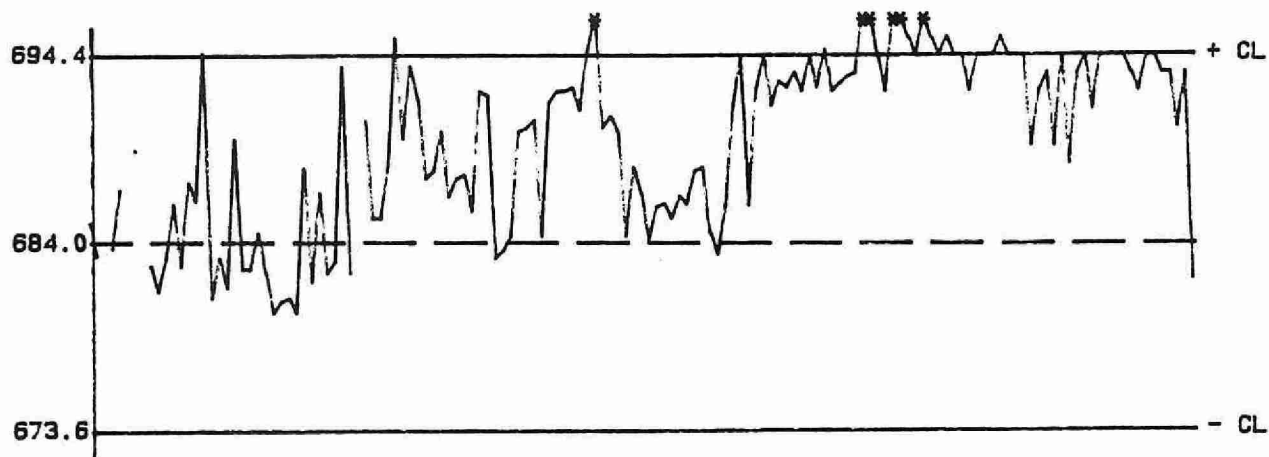
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
48	0.0 - 100.0	5.89	9.1
71	100.0 - 200.0	4.82	3.1
99	200.0 - 400.0	5.16	1.8
26	400.0 - 750.0	8.93	1.6
244	Overall	5.73	N/A

OTHER CHECKS:

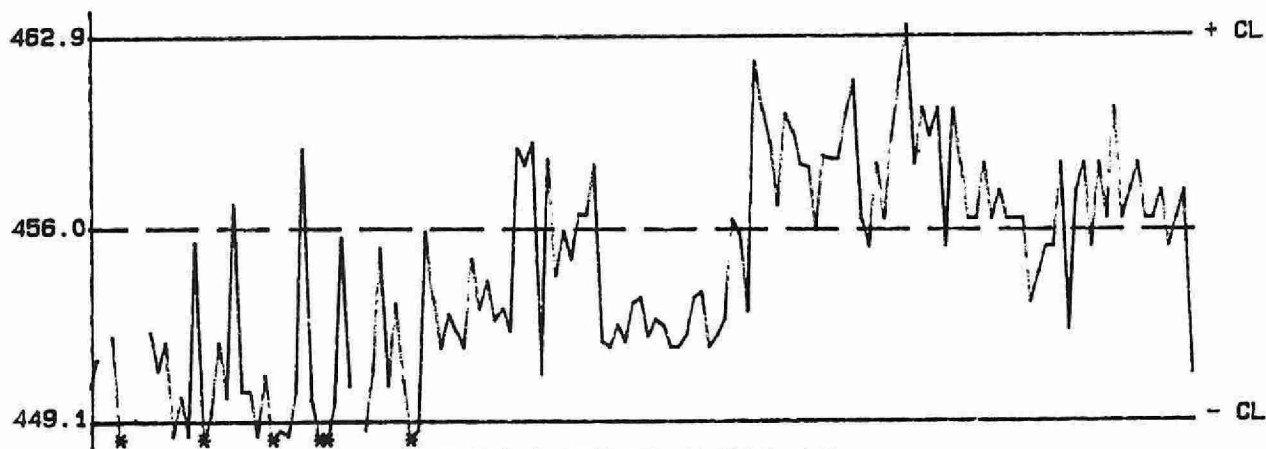
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	140	0.15	0.056

QUALITY CONTROL GRAPHS ALKALINITY WQSDIRT (MG/L AS CaCO3)

FROM: 05/01/87
TO: 23/12/87

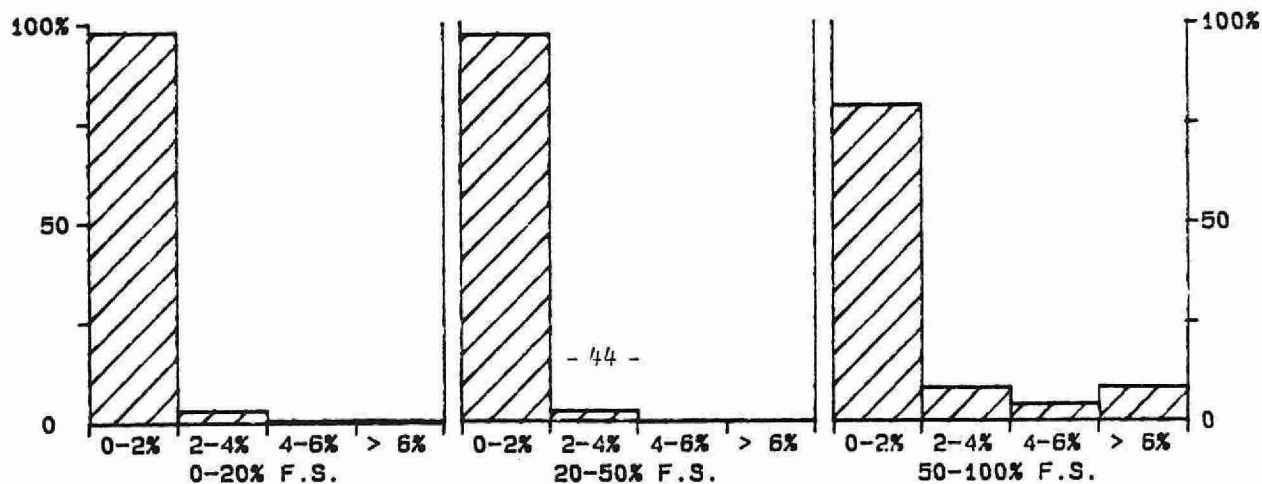


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L AS CaCO3

***** ALKALINITY - TFE @ PH 3.8 *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 21/10/85
LIS Test Name Code	: ALKT3	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL
Container : Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 3.8. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 2 standard buffers - 2 times daily

TOTAL FIXED 3.8
QUALITY CONTROL DATA FROM 02/01/87 TO 24/12/87

Lab: Dorset

Analytical Range: 1.92 to 100.00 mg/l as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	203	29.00	29.40	0.40	0.728
b :	203	14.00	13.77	-0.23	0.385
a+b :	203	43.00	43.18	0.18	1.027
a-b :	203	15.00	15.63	0.63	0.549

s.d.(AB): Sw(within run): 0.388 S(between runs): 0.582 S/Sw: 1.50

On any given day the calibration is accepted if the values obtained lie within the ranges:

39.93 to 46.07 for A+B
12.95 to 17.05 for A-B

DUPLICATES:

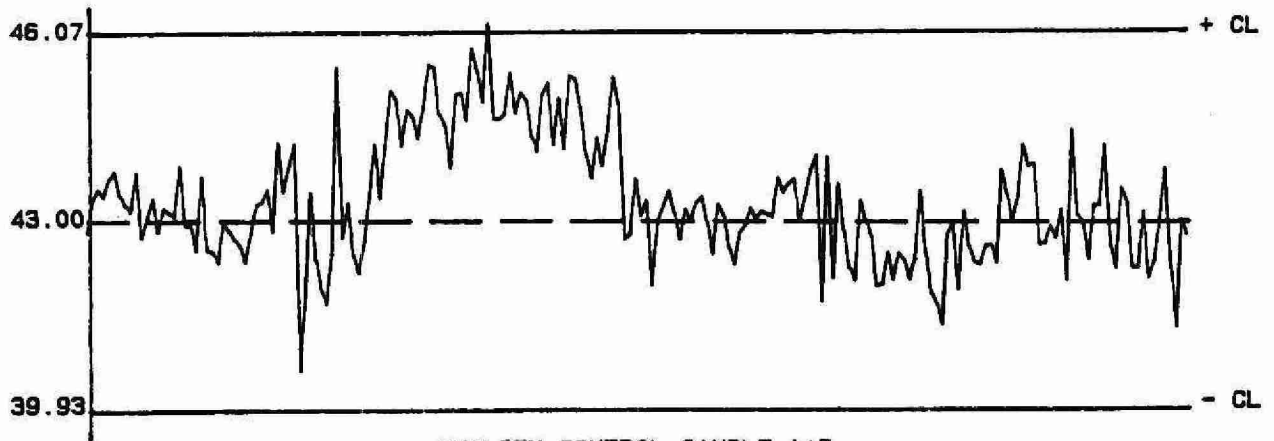
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
554	0.00 - 20.00	0.384	3.1
28	20.00 - 40.00	0.361	1.6
1	40.00 - 60.00	N/A	N/A
6	60.00 - 100.00	0.233	0.3
589	Overall	0.407	N/A

OTHER CHECKS:

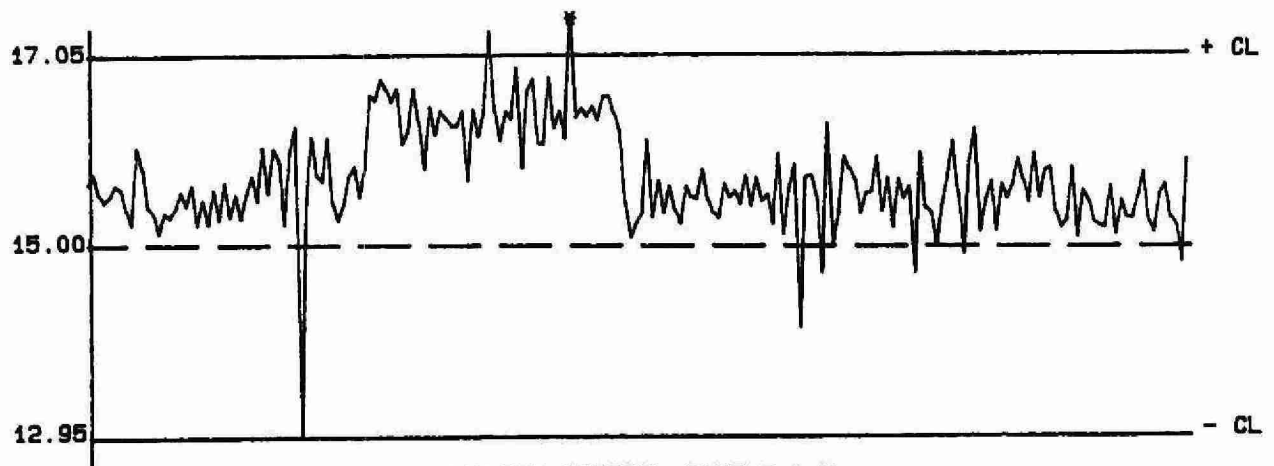
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	198	8.13	0.555

QUALITY CONTROL GRAPHS TOTAL FIXED 3.8 (MG/L AS CaCO₃)

FROM: 02/01/87
TO: 24/12/87

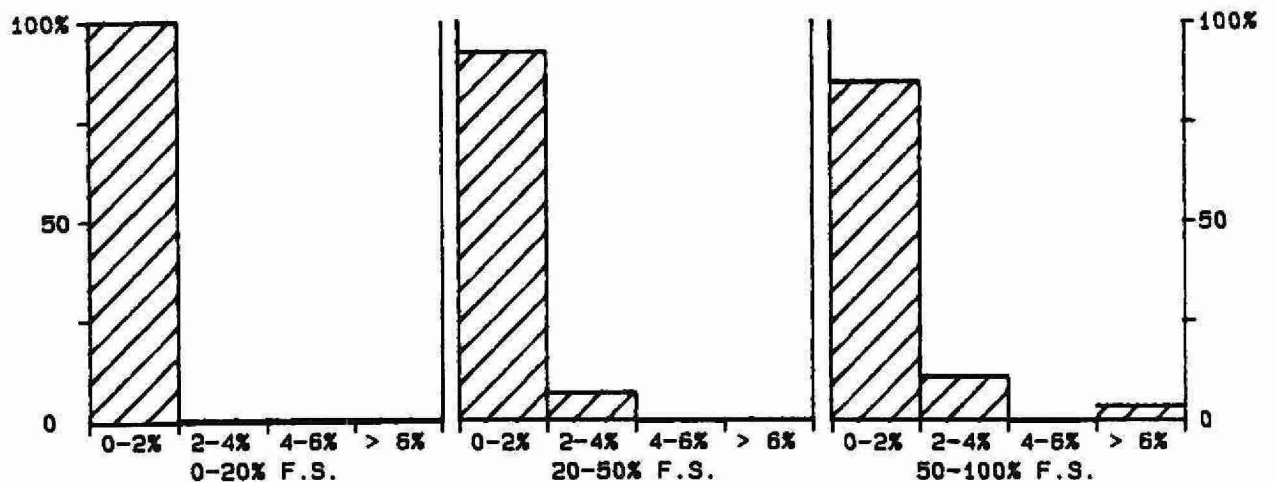


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 41 MG/L AS CaCO₃

***** ALUMINUM - SOIL (Xca) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALECA	Units	: ug/g as Al (dried)
Work Station Code	: DOSOLAL	Unit Code	: 073813
Method Code	: 3144A5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g (dry <2 mm)
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 10 g sample plus 20 mL 0.01 M calcium chloride is agitated for 5 minutes, centrifuged and filtered. The filtration is analyzed for Al by AAS at 309.3 nm using an NO₂-acetylene flame. Approximate absorbance: 0.1 at the full scale level

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Two soil samples representing different soil types
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM-SOIL(Xca)
QUALITY CONTROL DATA FROM 30/03/87 TO 24/10/87

Lab: Dorset Soils

Analytical Range: 2.3 to 40.0 ug/g as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	17	30.0	30.4	0.4	1.00
b :	17	10.0	9.9	-0.1	0.96
a+b :	17	40.0	40.3	0.3	1.64
a-b :	17	20.0	20.5	0.5	1.08

s.d.(AB): Sw(within run): 0.76 S(between runs): 0.98 S/Sw: 1.28

On any given day the calibration is accepted if the values obtained lie within the ranges:

35.2 to 44.8 for A+B
 16.8 to 23.2 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	17	4.6	4.6	0.64
r2 :	16	15.3	15.3	1.49
r3 :	17	28.3	28.3	2.41

DUPLICATES:

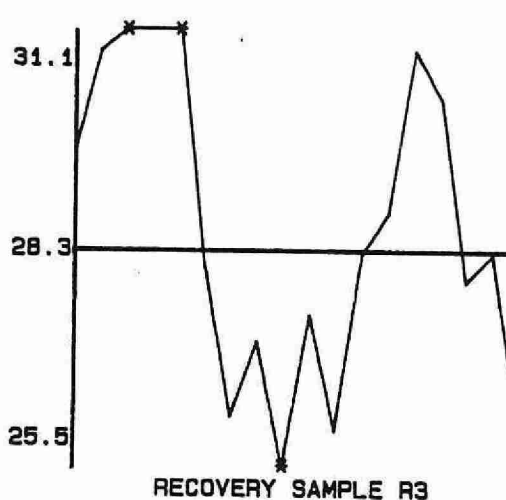
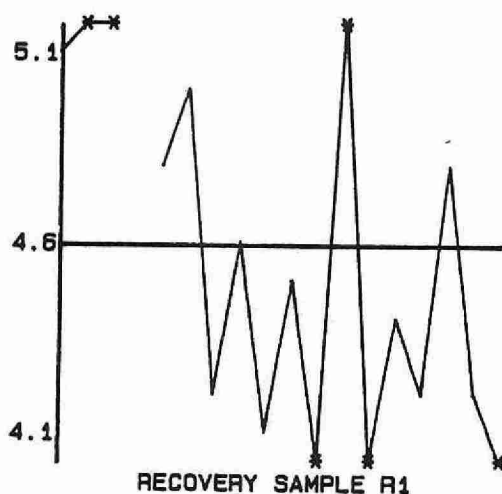
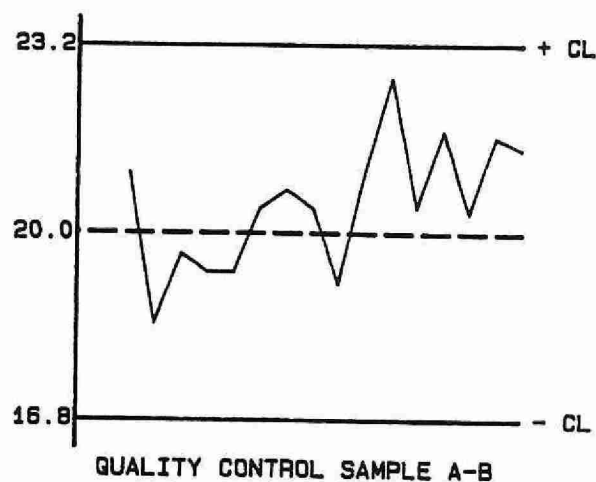
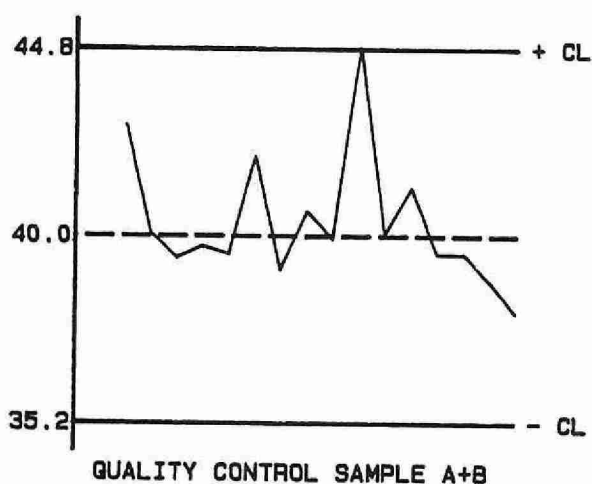
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	46	0.0 - 10.0	0.46	25.4
	7	10.0 - 20.0	0.73	4.6
	0	20.0 - 40.0	N/A	N/A
	53	Overall	0.51	N/A

OTHER CHECKS:

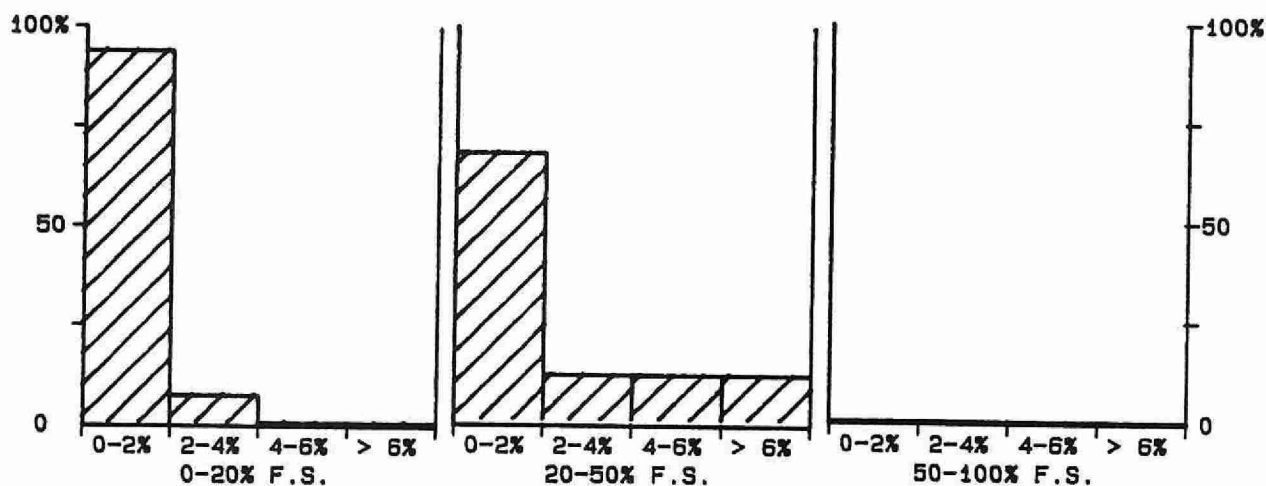
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	16	0.0	0.08

QUALITY CONTROL GRAPHS ALUMINUM-SOIL (XCA) (UG/G AS AL)

FROM: 30/03/87
TO: 24/10/87



* DATA > 15% OUTSIDE CL



***** ALUMINUM - CV REACT *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 24/10/85
LIS Test Name Code	: ALEXCV,ALNDCV	Units	: ug/L as CV react Al
Work Station Code	: DOMISC	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, and Groundwaters		

SAMPLING:

Quantity Required : 8 mL
Container : Polystyrene tube, capped

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol-violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as ug/L as CV reactive Al.

INSTRUMENTATION:

Automated autoanalyzer/sampler system with colourimeter and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 10 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

ALUMINUM - CV REACT
QUALITY CONTROL DATA FROM 16/01/87 TO 29/12/87

Lab: Dorset

Analytical Range: 8 to 1000 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	750	748	-2	10.7
b :	46	250	248	-2	7.5
a+b :	46	1000	996	-4	16.9
a-b :	46	500	500	0	7.5
c :	46	75	75	0	2.1
d :	46	25	29	4	2.7
c+d :	46	100	105	5	3.8
c-d :	46	50	46	-4	3.0

s.d.(AB): Sw(within run): 5.3 S(between runs): 9.2 S/Sw: 1.74
s.d.(CD): Sw(within run): 2.1 S(between runs): 2.4 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

925 to 1075 for A+B
450 to 550 for A-B
85 to 115 for C+D
40 to 60 for C-D

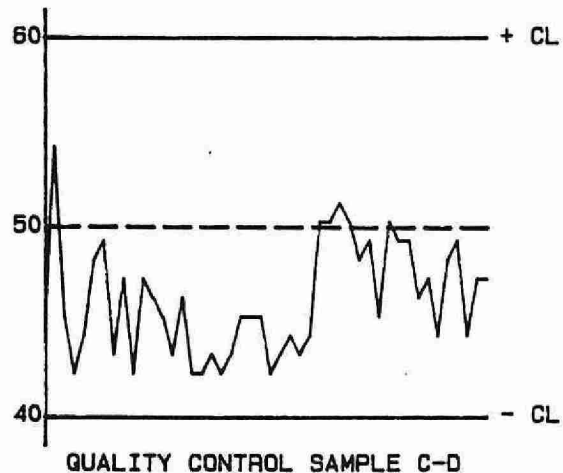
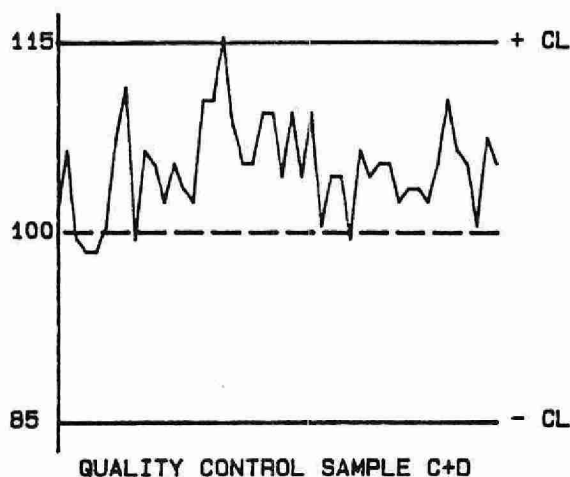
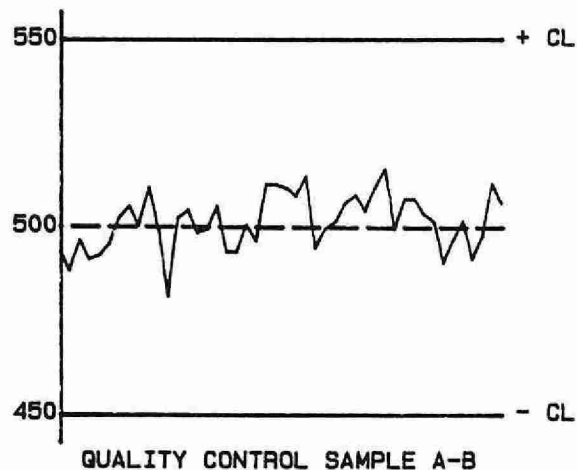
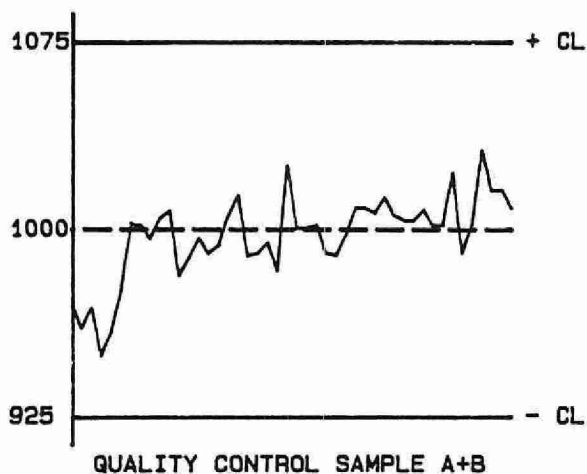
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	65	0 - 50	1.6	7.2
	23	50 - 100	1.7	2.3
	40	100 - 250	5.6	3.9
	6	250 - 500	6.7	1.7
	1	500 - 1000	N/A	N/A
	135	Overall	3.6	N/A

OTHER CHECKS:

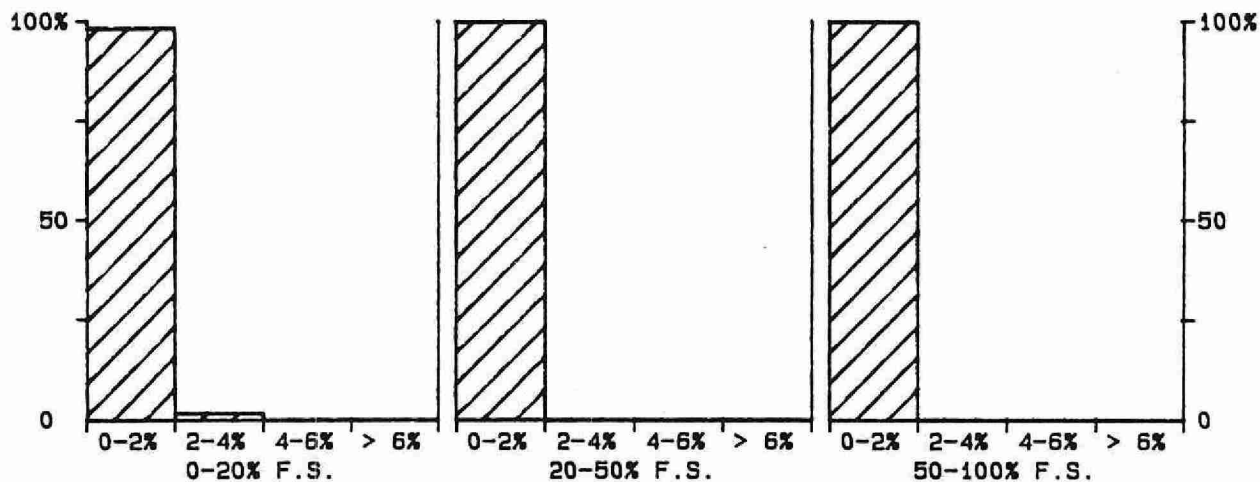
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	1	165	N/A
Long Term Blank :	46	0	0.0

QUALITY CONTROL GRAPHS ALUMINUM - CV REACT (UG/L AS AL)

FROM: 16/01/87
TO: 29/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** ALUMINUM - SOIL (Xdi) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEDI	Units	: % by weight Al
Work Station Code	: DOMETDI	Unit Code	: 070813
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm.

ANALYTICAL PROCEDURE:

Aluminum is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80 C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
N.B. Iron is determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

ALUMINIUM - SOIL (Xdi)
QUALITY CONTROL DATA FROM 12/03/87 TO 02/11/87

Lab: Dorset Soils

Analytical Range: 0.04 to 1.00 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	12	0.75	0.77	0.02	0.018
b :	12	0.25	0.25	0.00	0.012
a+b :	12	1.00	1.02	0.02	0.028
a-b :	12	0.50	0.51	0.01	0.014

s.d.(AB): Sw(within run): 0.010 S(between runs): 0.015 S/Sw: 1.55

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 to 1.07 for A+B
0.45 to 0.55 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	16	1.05	1.05	0.048
r2 :	15	0.19	0.20	0.021
r3 :	16	0.16	0.17	0.016

DUPLICATES:

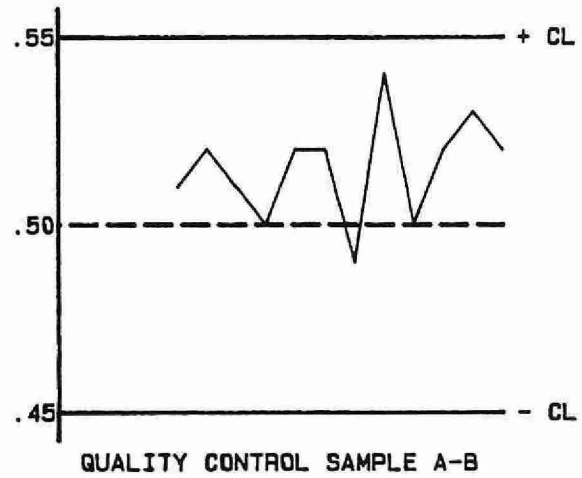
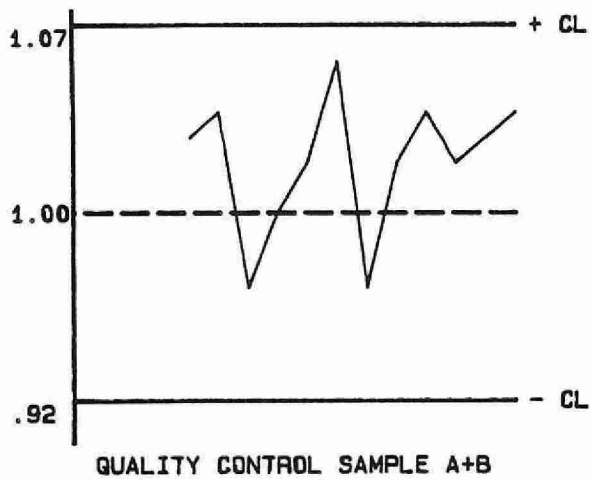
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	32	0.00 - 0.20	0.007	5.3
	13	0.20 - 0.50	0.011	3.6
	5	0.50 - 1.00	0.015	2.3
	50	Overall	0.009	N/A

OTHER CHECKS:

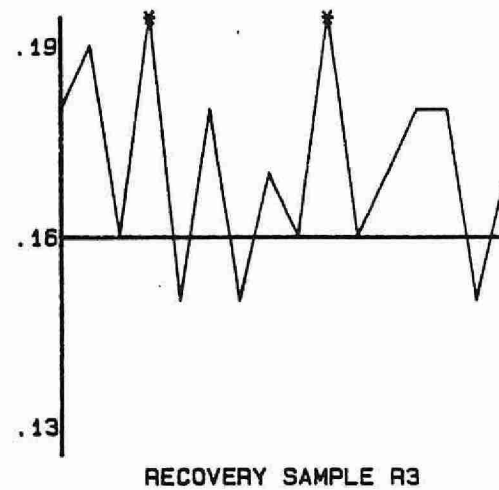
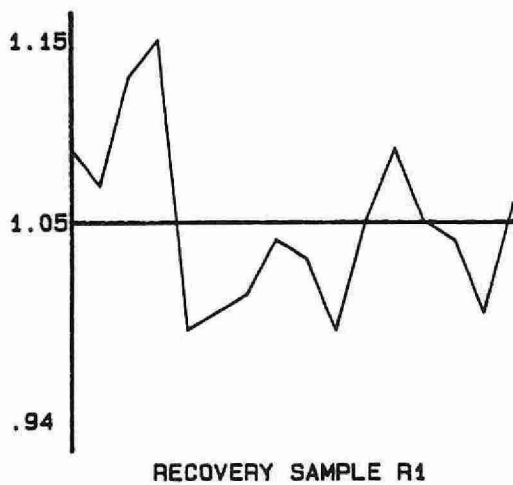
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	16	0.00	0.003

QUALITY CONTROL GRAPHS ALUMINIUM - SOIL (XDI) (% AS AL)

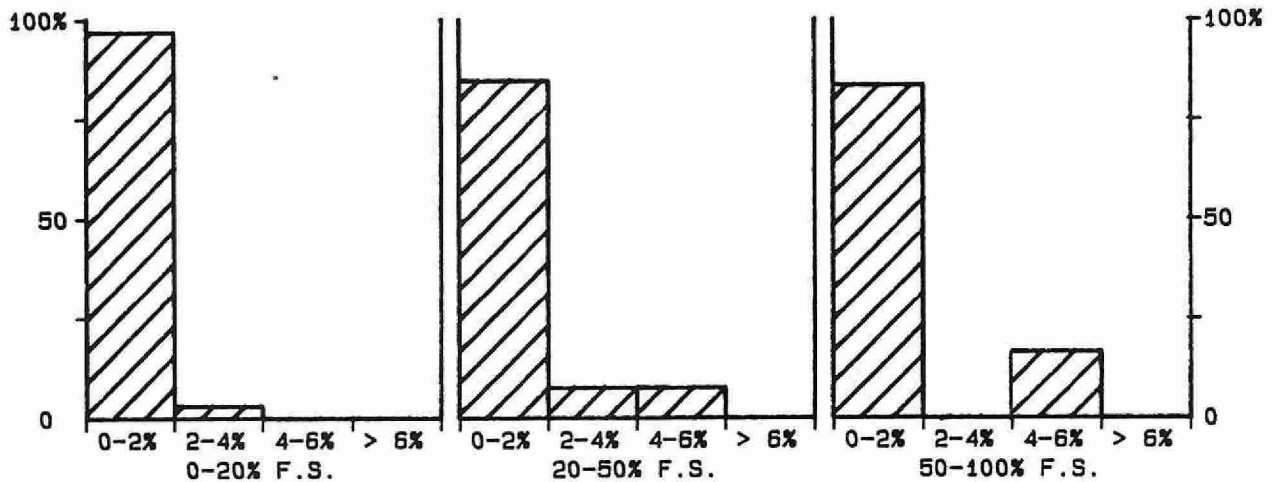
FROM: 12/03/87
TO: 02/11/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



***** ALUMINUM - SOIL (Xpy) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALEPY	Units	: % by weight Al
Work Station Code	: DOMETALX	Unit Code	: 070813
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2mm.

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 15 minutes and the supernatant is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.
Approximate absorbance: 0.3 at the full scale level
N.B. Iron and manganese may be determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

ALUMINUM - SOIL (Xpy)
QUALITY CONTROL DATA FROM 08/01/87 TO 11/12/87

Lab: Dorset Soils

Analytical Range: 0.04 to 0.50 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	14	0.38	0.38	0.00	0.012
b :	14	0.13	0.13	0.00	0.008
a+b :	14	0.50	0.51	0.01	0.015
a-b :	14	0.25	0.25	-0.00	0.012

s.d.(AB): Sw(within run): 0.008 S(between runs): 0.010 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.46 to 0.54 for A+B
0.23 to 0.27 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	20	0.90	0.86	0.037
r2 :	22	0.15	0.15	0.019
r3 :	22	0.16	0.16	0.016

DUPLICATES:

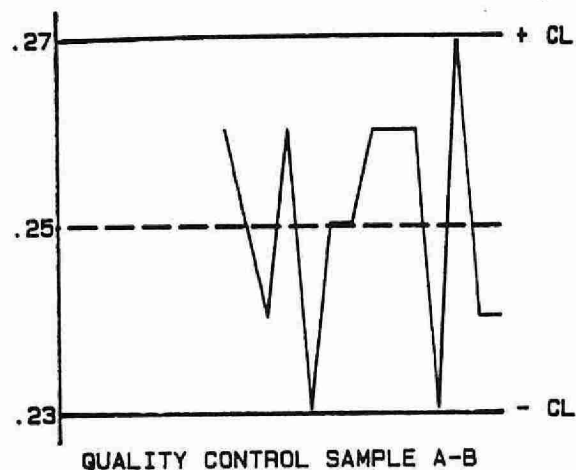
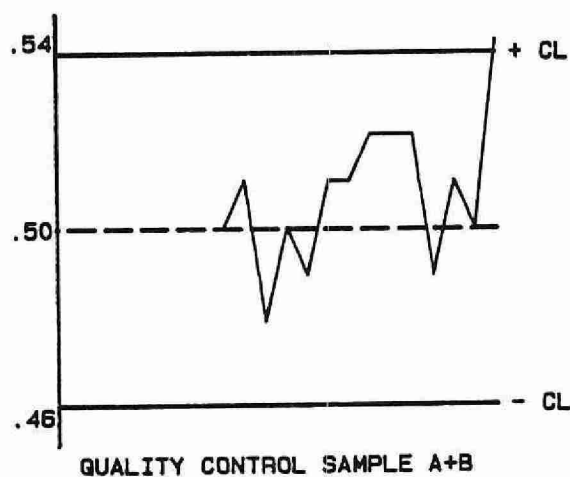
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0.00 - 0.10	0.008	14.7
21	0.10 - 0.25	0.010	6.5
18	0.25 - 0.50	0.010	2.5
67	Overall	0.009	N/A

OTHER CHECKS:

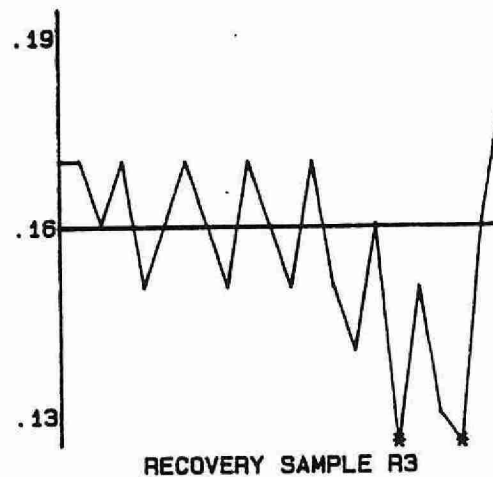
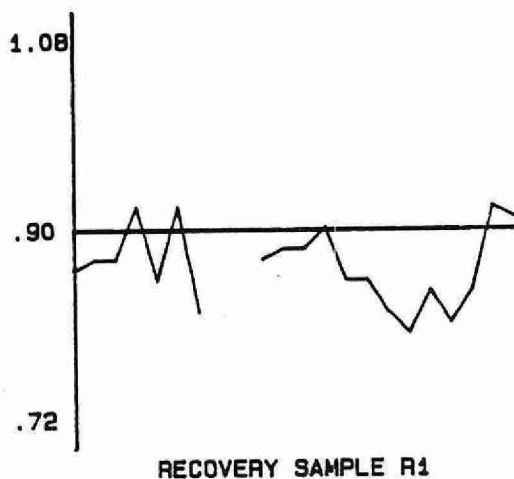
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	22	0.00	0.002

QUALITY CONTROL GRAPHS ALUMINUM - SOIL (XPY) (% AS AL)

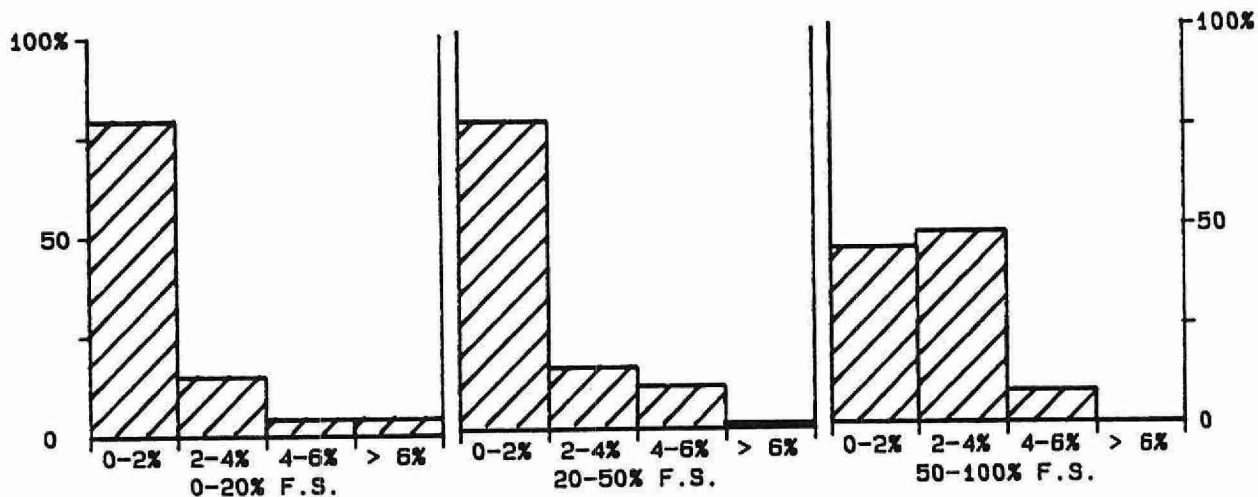
FROM: 08/01/87
TO: 11/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .5 % AS AL

***** ALUMINUM - SOIL (Xsc) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ALESC	Units	: meq/100 g Al
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Al by AAS at 309.3 nm with a NO₂-acetylene flames.

Approximate absorbance: 0.2 at the full scale level.

N.B. Calcium, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -three g sample used for all soil types (6 g previously used for sandy soils)
01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown - average value used.

ALUMINUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 07/04/87 TO 26/12/87

Lab: Dorset Soils

Analytical Range: 0.14 to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	19	1.88	1.85	-0.02	0.045
b :	19	0.63	0.63	0.00	0.037
a+b :	19	2.50	2.48	-0.02	0.052
a-b :	19	1.25	1.22	-0.03	0.064

s.d.(AB): Sw(within run): 0.045 S(between runs): 0.041 S/Sw: 0.91

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.22 to 2.78 for A+B
1.06 to 1.44 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	19	1.52	1.63	0.117
r2 :	19	0.02	0.02	0.024
r3 :	19	0.02	0.03	0.022

DUPLICATES:

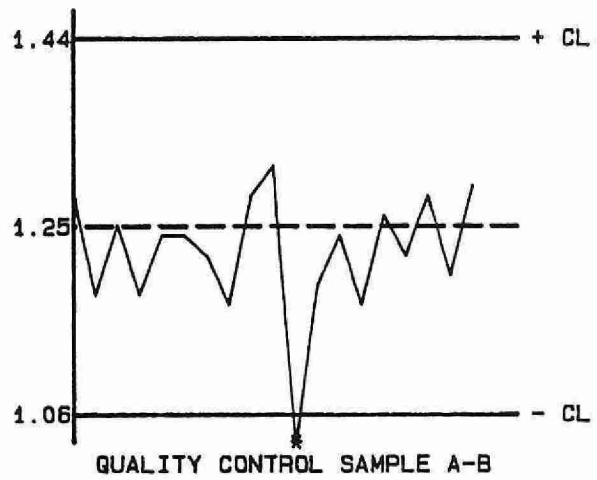
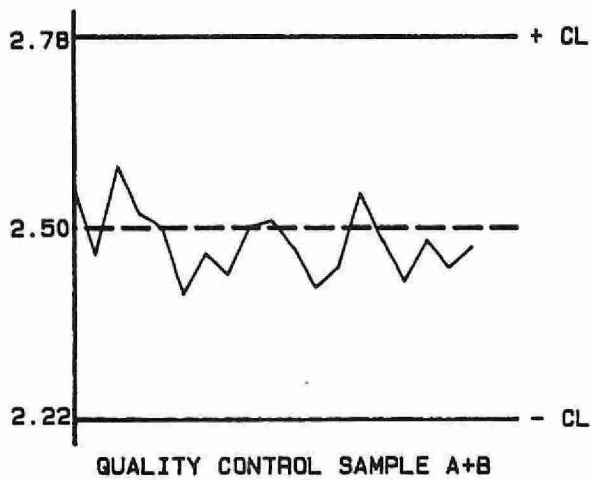
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
43	0.00 - 0.50	0.029	25.1
6	0.50 - 1.25	0.113	14.1
9	1.25 - 2.50	0.127	8.0
58	Overall	0.067	N/A

OTHER CHECKS:

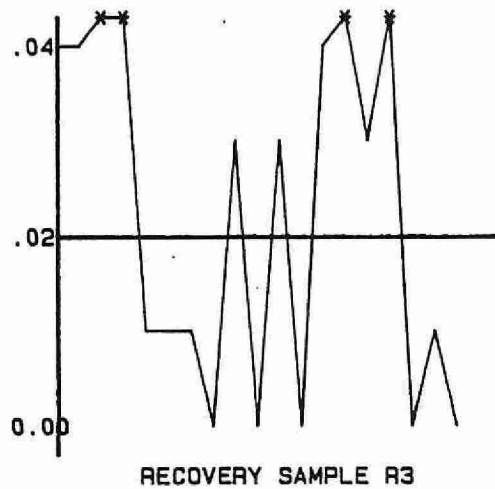
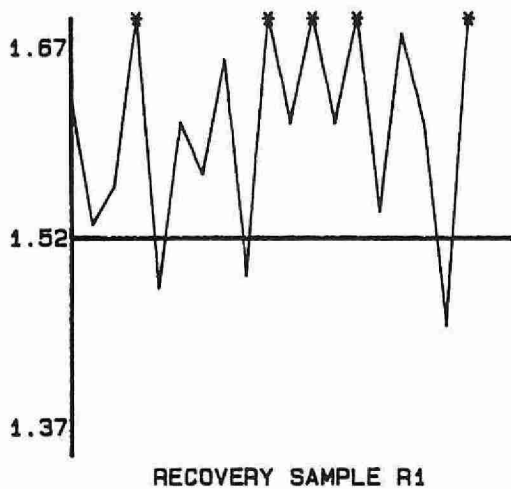
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	19	0.01	0.015

QUALITY CONTROL GRAPHS ALUMINUM - SOIL (XSC) (MEQ/100G)

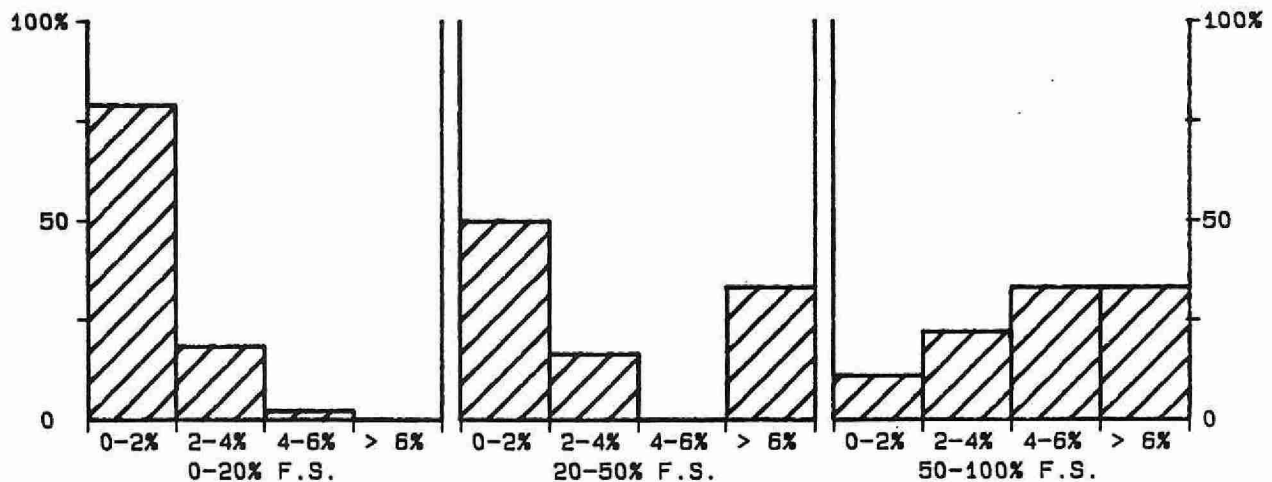
FROM: 07/04/87
TO: 26/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2.5 MEQ/100G

***** ALUMINUM - TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 06/09/83
LIS Test Name Code	: ALUT	Units	: ug/L as Al
Work Station Code	: DOAAS	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Biota and Groundwaters		

SAMPLING:

Quantity Required : 1 mL
Container : 0.5 ml Polystyrene Tube, capped

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 309.3 nm.
Approximate absorbance: .5 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 5 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

TOTAL ALUMINUM AAS)
QUALITY CONTROL DATA FROM 17/03/87 TO 30/12/87

Lab: Dorset

Analytical Range: 5 to 200 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	60	140	138	-2	5.1
b :	60	70	71	1	4.4
a+b :	60	210	209	-1	8.4
a-b :	60	70	67	-3	4.4
c :	61	35	38	3	2.5
d :	61	7	7	0	1.5
c+d :	61	42	44	2	3.1
c-d :	61	28	31	3	2.8

s.d.(AB): Sw(within run): 3.1 S(between runs): 4.8 S/Sw: 1.53
s.d.(CD): Sw(within run): 2.0 S(between runs): 2.1 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

180 to 240 for A+B
50 to 90 for A-B
27 to 57 for C+D
18 to 38 for C-D

DUPLICATES:

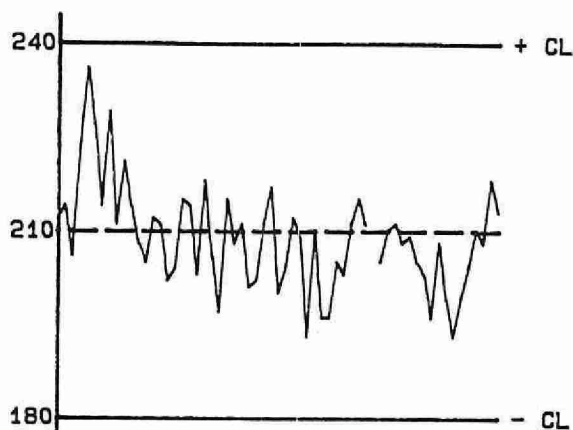
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0 - 5	1.0	29.8
10	5 - 10	1.6	20.6
18	10 - 25	1.8	11.3
55	25 - 100	2.9	4.5
56	100 - 200	6.3	4.5
158	Overall	4.2	N/A

OTHER CHECKS:

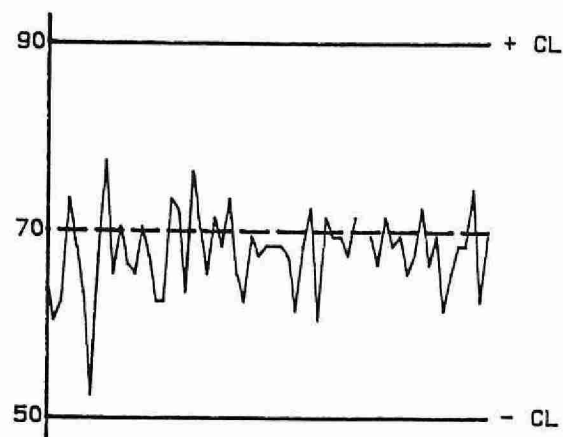
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	0	N/A	N/A
Long Term Blank :	61	0	0.0

QUALITY CONTROL GRAPHS TOTAL ALUMINUM (AAS) (UG/L AS AL)

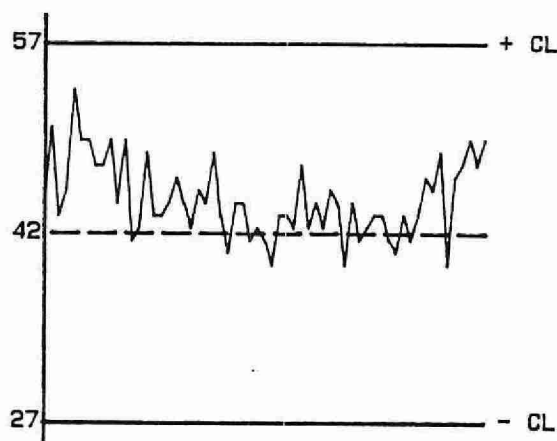
FROM: 17/03/87
TO: 30/12/87



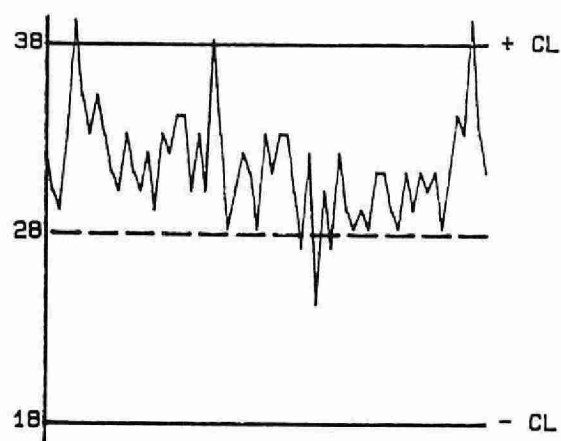
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

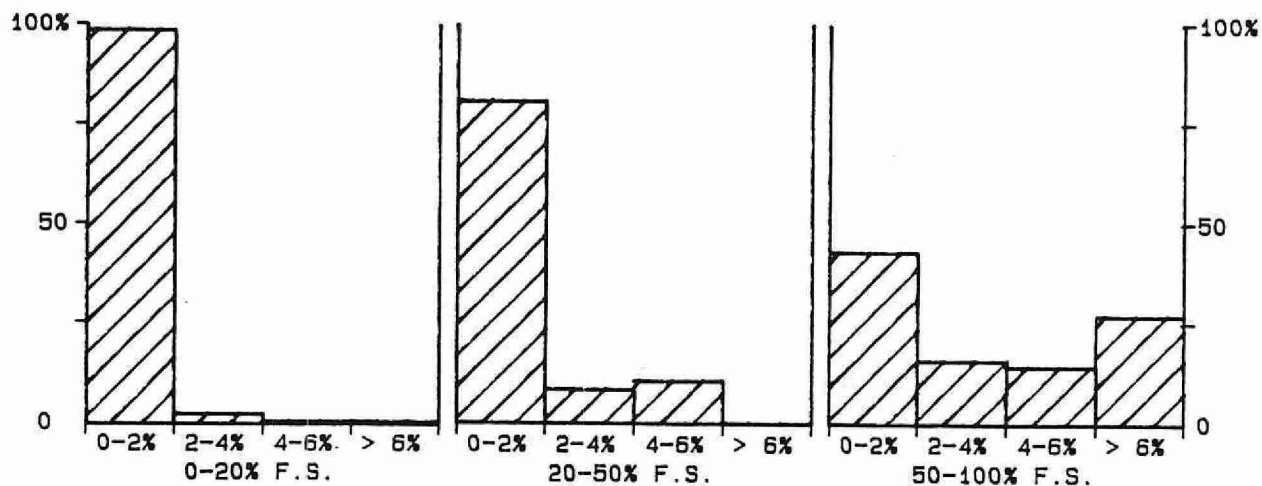


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 UG/L AS AL

***** CADMIUM - TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/11/84
LIS Test Name Code	: CDUT	Units	: ug/L as Cd
Work Station Code	: DOAAS	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Biota		

SAMPLING:

Quantity Required : 1 mL
Container : 500 ml acid washed Teflon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: .400 at the full scale level

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 4 standards daily

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA

TOTAL CADMIUM (AAS)
QUALITY CONTROL DATA FROM 05/01/87 TO 31/12/87

Lab: Dorset

Analytical Range: 0.187 to 2.000 ug/l as Cd

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	44	1.600	1.649	0.049	0.1187
b :	44	0.600	0.511	-0.089	0.0972
a+b :	44	2.200	2.161	-0.039	0.1697
a-b :	44	1.000	1.138	0.138	0.1353
c :	43	0.160	0.197	0.037	0.0554
d :	42	0.060	0.049	-0.011	0.0201
c+d :	42	0.220	0.244	0.024	0.0646
c-d :	42	0.100	0.146	0.046	0.0487

s.d.(AB): Sw(within run): 0.0957 S(between runs): 0.1085 S/Sw: 1.13
s.d.(CD): Sw(within run): 0.0344 S(between runs): 0.0417 S/Sw: 1.21

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.600 to 2.800 for A+B
0.600 to 1.400 for A-B
-0.001 to 0.441 for C+D
-0.048 to 0.247 for C-D

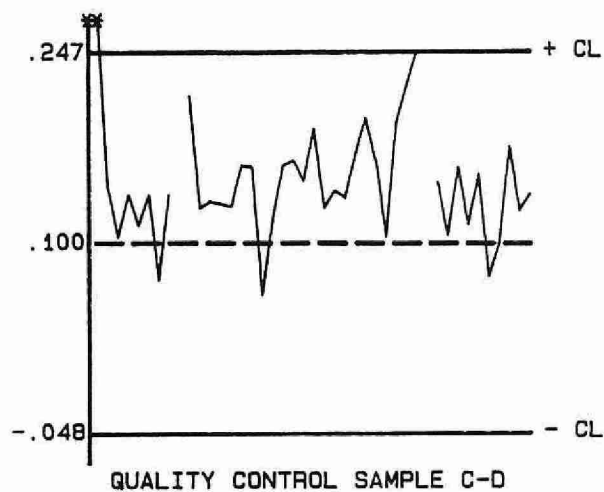
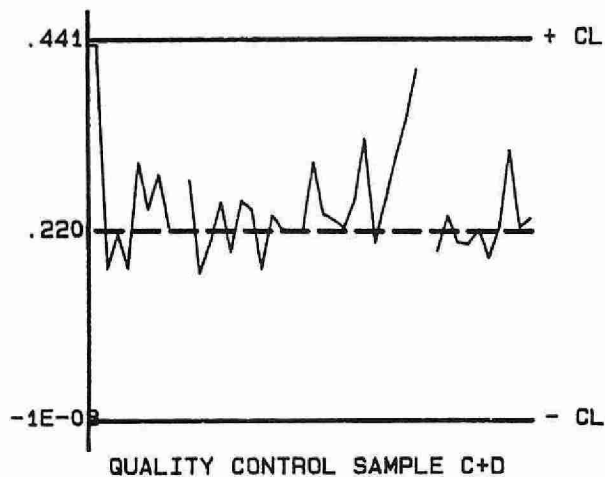
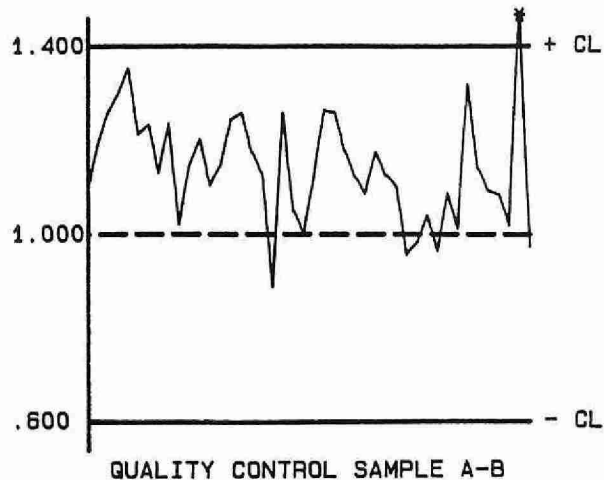
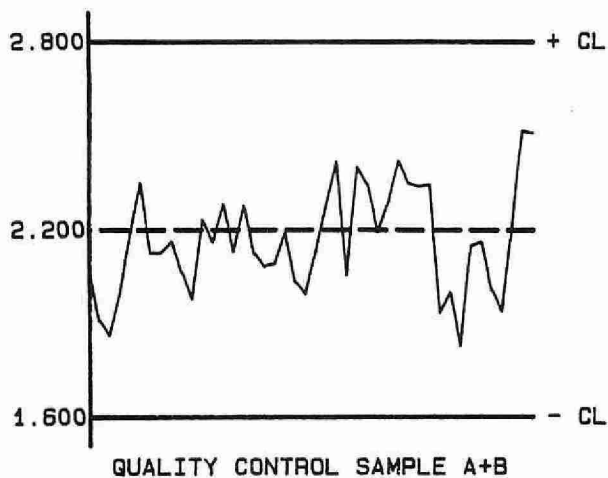
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	52	0.000 - 0.250	0.0375	55.2
	16	0.250 - 0.500	0.0537	15.8
	25	0.500 - 1.000	0.1590	23.3
	17	1.000 - 1.500	0.1532	12.4
	16	1.500 - 2.000	0.1440	8.6
	126	Overall	0.1084	N/A

OTHER CHECKS:

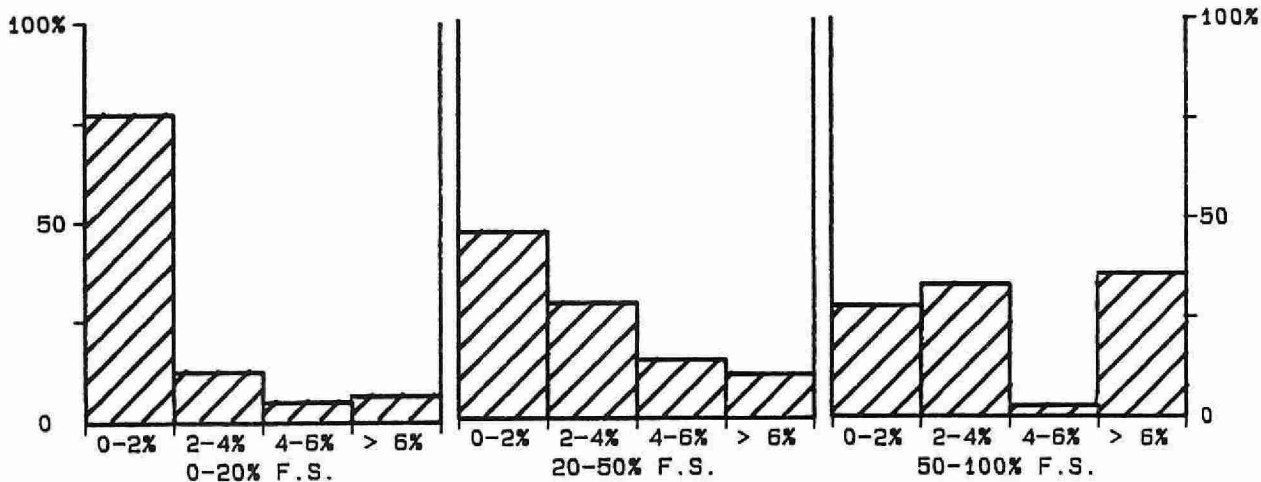
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	0	N/A	N/A
Long Term Blank :	43	0.000	0.0000

QUALITY CONTROL GRAPHS TOTAL CADMIUM (AAS) (UG/L AS CD)

FROM: 05/01/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 UG/L AS CD

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Polystyrene

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.02	T value: 0.1
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of samples was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

CALCIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Atomic Absorption

Analytical Range: 0.09 to 2.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	68	1.20	1.22	0.02	0.024
b :	68	0.20	0.22	0.02	0.020
a+b :	68	1.40	1.44	0.04	0.031
a-b :	68	1.00	1.00	-0.00	0.031

s.d.(AB): Sw(within run): 0.022 S(between runs): 0.022 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

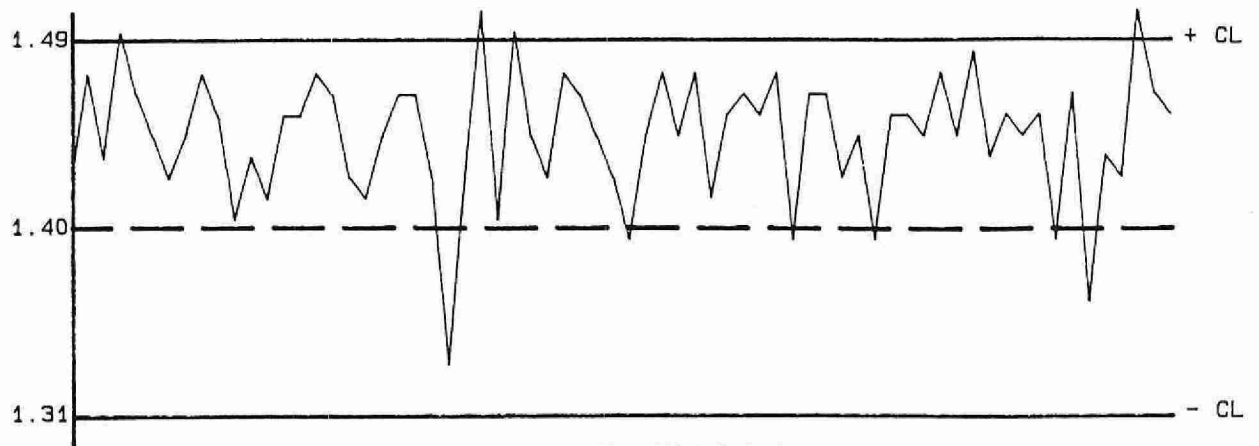
1.31 to 1.49 for A+B
0.94 to 1.06 for A-B

DUPLICATES:

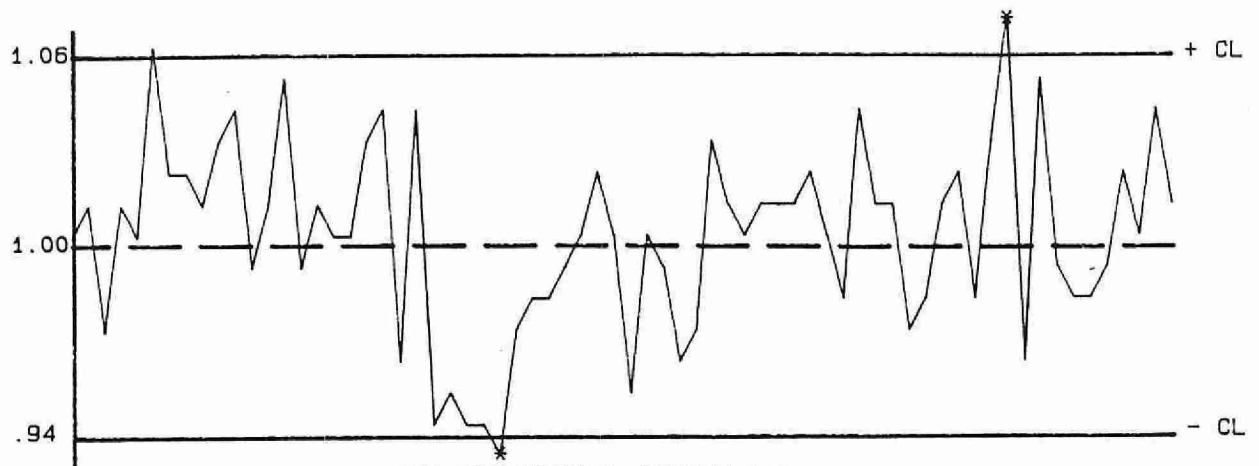
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
75	0.00 - 0.20	0.018	21.6
45	0.20 - 0.50	0.036	12.1
26	0.50 - 1.00	0.050	7.4
15	1.00 - 2.00	0.072	5.0
161	Overall	0.037	N/A

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 06/01/87
TO: 23/12/87

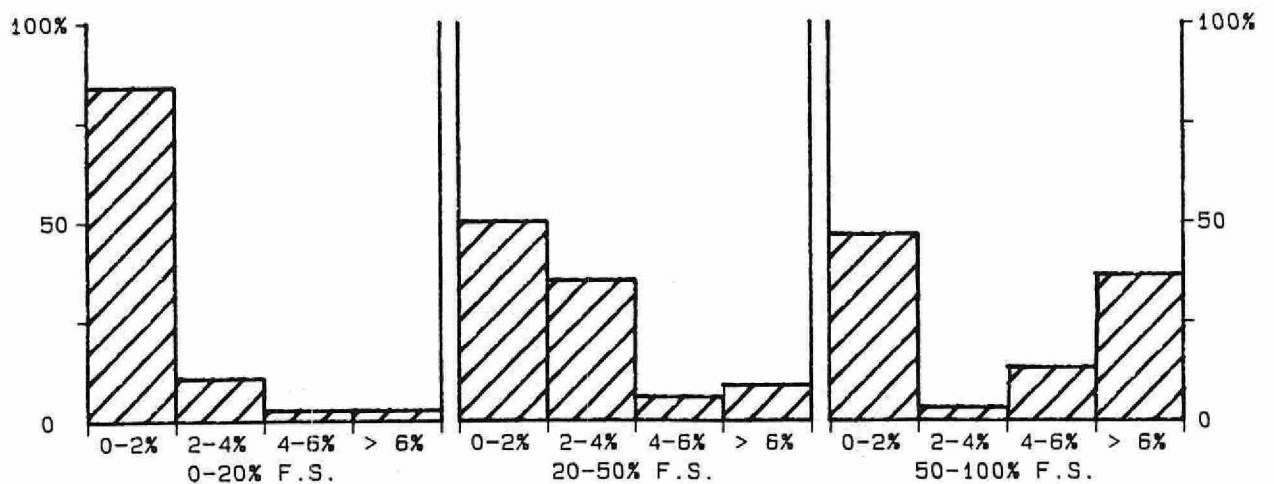


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS CA

***** CALCIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.04 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards, and LTB e.g., QCA
Drift : BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

01/12/81 -Calibration range became 20.0 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMCAMGH) was added; full scale: 5.00 mg/L. This range is currently restricted to special programs.
01/09/84 -Analytical range (RMCAMGH) was increased from 20.0 to 50.0 mg/L full scale. Calibration technique was changed from quadratic to linear interpolation. Magnesium is no longer determined simultaneously.
25/09/85 -Calibration range became 35.0 mg/L full scale; second analytical range was dropped. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 5, 35, and 50 mg/L as Ca full scale.
06/09/87 -Changed full scale to 40 mg/L as Ca
 Number of cal.standards changed from 10 to 11
 Number of QC standards changed from 2 to 3 plus one LTB

CALCIUM
QUALITY CONTROL DATA FROM 05/01/87 TO 02/04/87

Lab: Atomic Absorption

Analytical Range: 0.65 to 35.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	24	28.0	28.1	0.1	0.24
b :	24	2.45	2.49	0.04	0.047
a+b :	24	30.45	30.61	0.16	0.268
a-b :	24	25.55	25.63	0.08	0.229

s.d.(AB): Sw(within run): 0.16 S(between runs): 0.17 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

28.87 to 32.02 for A+B
 24.50 to 26.60 for A-B

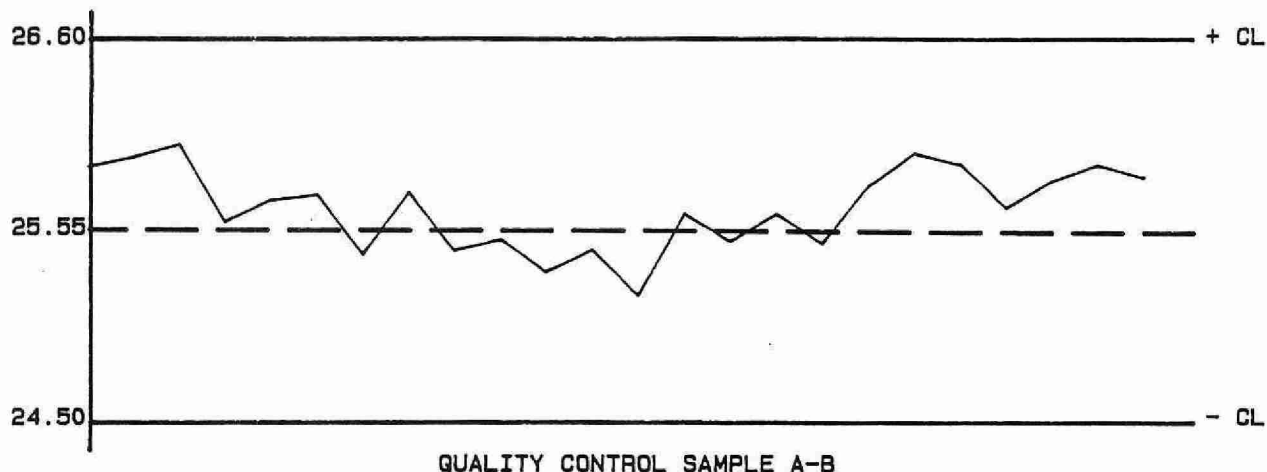
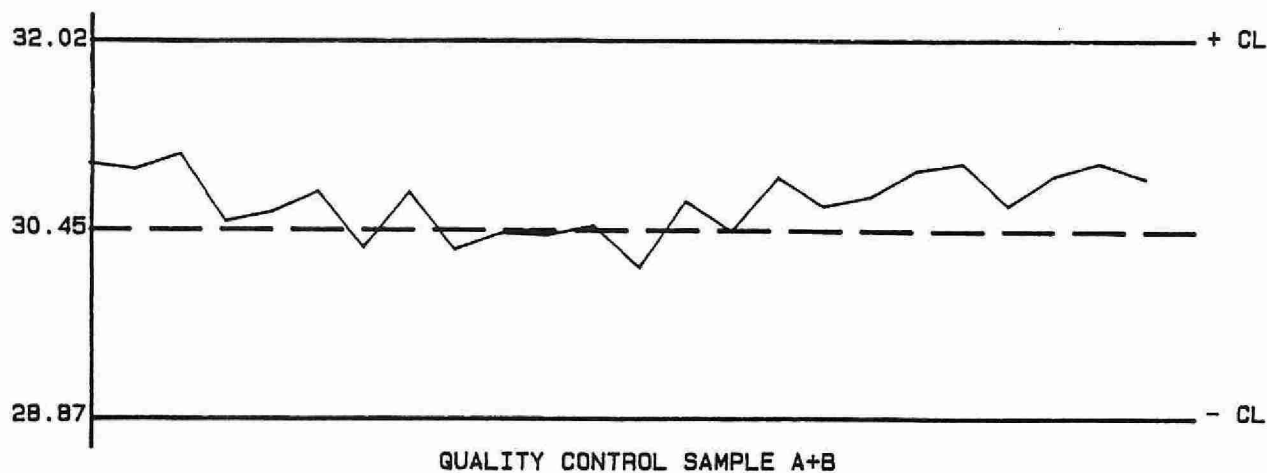
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	10	0.00 - 1.75	0.131	12.3
	31	1.75 - 3.50	0.209	8.0
	9	3.50 - 7.00	0.257	4.8
	2	7.00 - 17.50	0.332	3.2
	1	17.50 - 35.00	N/A	N/A
	53	Overall	0.211	N/A

OTHER CHECKS:

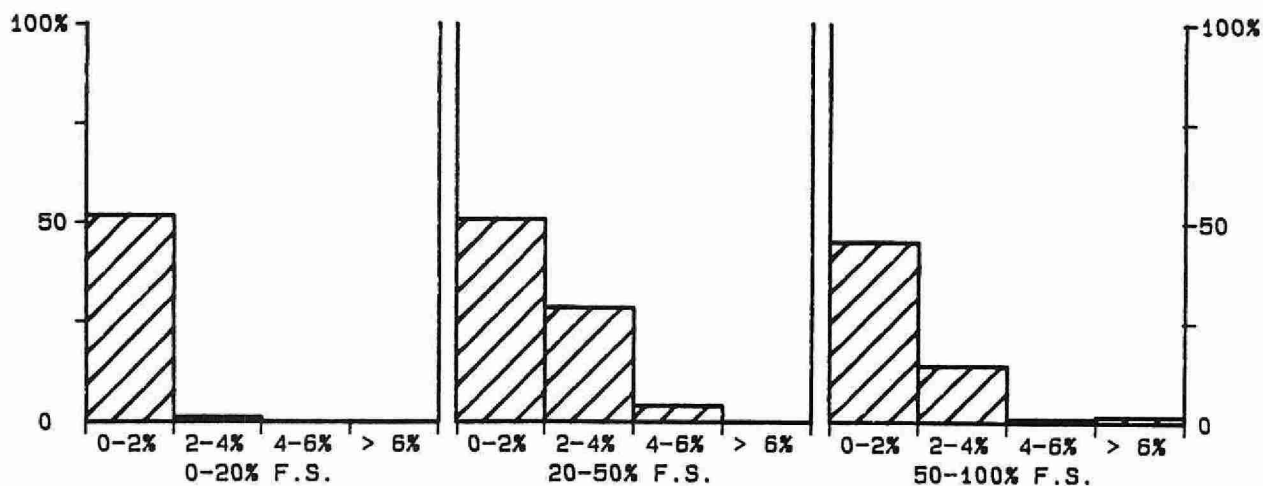
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	24	1.122	0.0531
Long Term Blank :	24	0.00	0.017

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 05/01/87
TO: 02/04/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 35 MG/L AS CA

CALCIUM
QUALITY CONTROL DATA FROM 08/04/87 TO 31/12/87

Lab: Atomic Absorption

Analytical Range: 0.61 to 40.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	90	32.0	31.9	-0.1	0.35
b :	89	8.00	8.00	-0.00	0.202
a+b :	89	40.00	39.89	-0.11	0.434
a-b :	89	24.00	23.89	-0.11	0.369
c :	89	8.00	8.00	-0.00	0.202
d :	89	2.00	2.08	0.08	0.272
c+d :	89	10.00	10.08	0.08	0.452
c-d :	89	6.00	5.92	-0.08	0.158

s.d.(AB): Sw(within run): 0.26 S(between runs): 0.29 S/Sw: 1.10
s.d.(CD): Sw(within run): 0.112 S(between runs): 0.240 S/Sw: 2.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.35 to 41.65 for A+B
22.90 to 25.10 for A-B
9.25 to 10.75 for C+D
5.50 to 6.50 for C-D

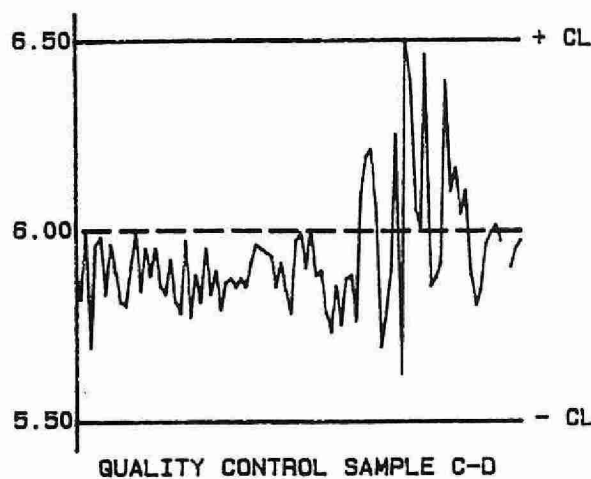
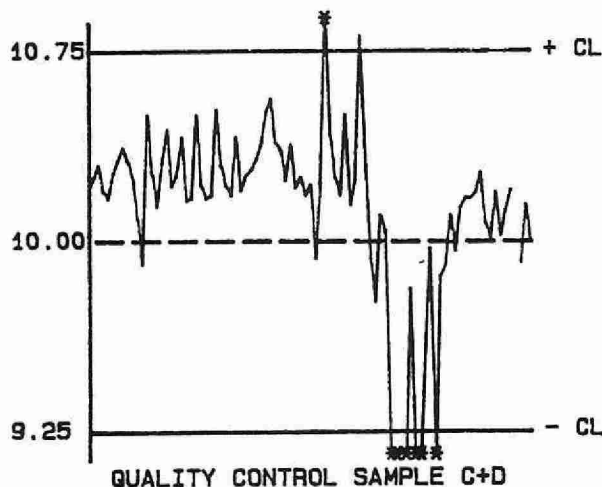
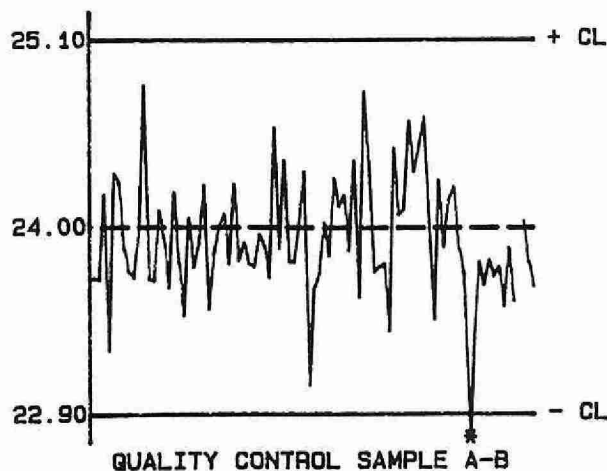
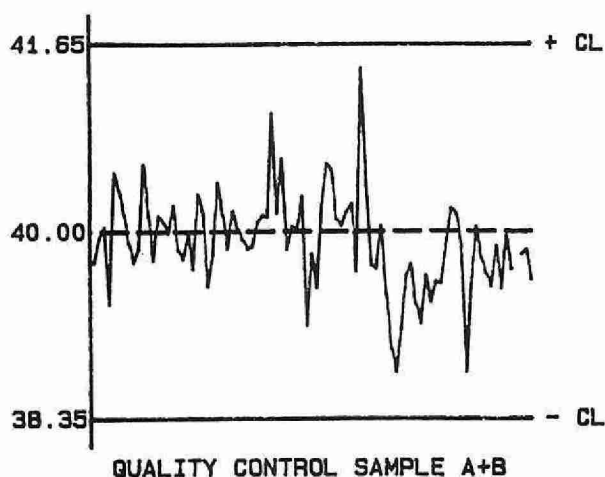
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	37	0.00 - 2.00	0.122	8.2
	73	2.00 - 5.00	0.219	7.5
	34	5.00 - 10.00	0.375	5.3
	10	10.00 - 20.00	0.622	4.4
	41	20.00 - 40.00	0.514	1.5
	195	Overall	0.347	N/A

OTHER CHECKS:

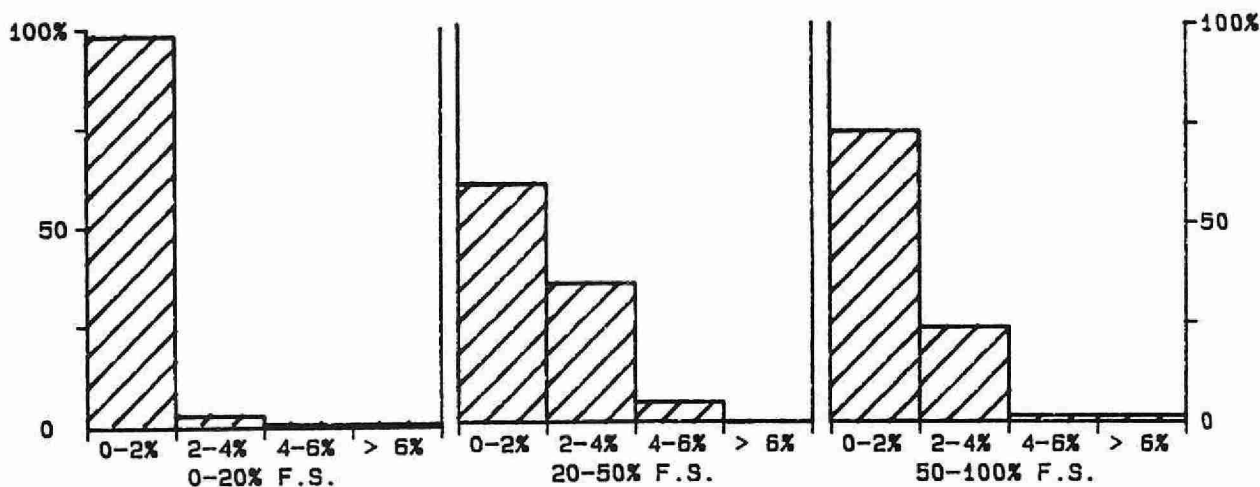
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	87	1.161	0.0690
Long Term Blank :	88	-0.00	0.018

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 08/04/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 MG/L AS CA

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train. Approximate absorbance: 1.121 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/07/82 -The method introduced on this date differed slightly from Method B for calcium in HAMES in that full scale for the analytical range was 50.0 mg/L; concentrations for the QC standards were also adjusted.
08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 200 mg/L to 175 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.
1985 -Three analytical ranges were used during 1985: 5,35, and 50 mg/L as Ca full scale.
03/03/87 -Changed full scale to 200 mg/L as Ca
Number of cal. standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus LTB

CALCIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 26/02/87

Lab: Atomic Absorption

Analytical Range: 1.23 to 175.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	20	140.0	140.9	0.9	1.61
b :	20	12.25	12.39	0.14	0.319
a+b :	20	152.25	153.34	1.09	1.802
a-b :	20	127.75	128.56	0.81	1.473

s.d.(AB): Sw(within run): 1.04 S(between runs): 1.16 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

144.38 to 160.12 for A+B
 122.50 to 133.00 for A-B

DUPLICATES:

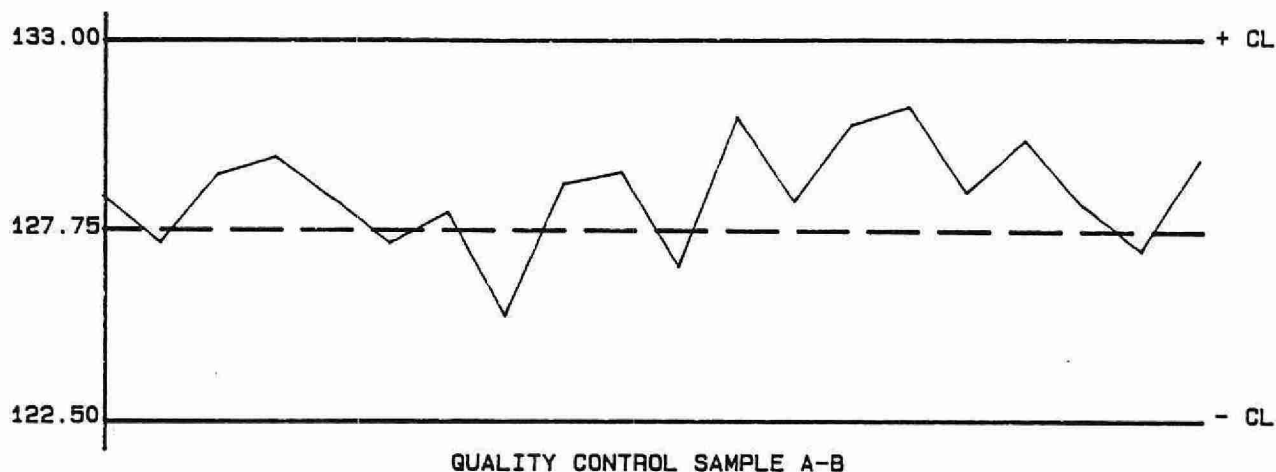
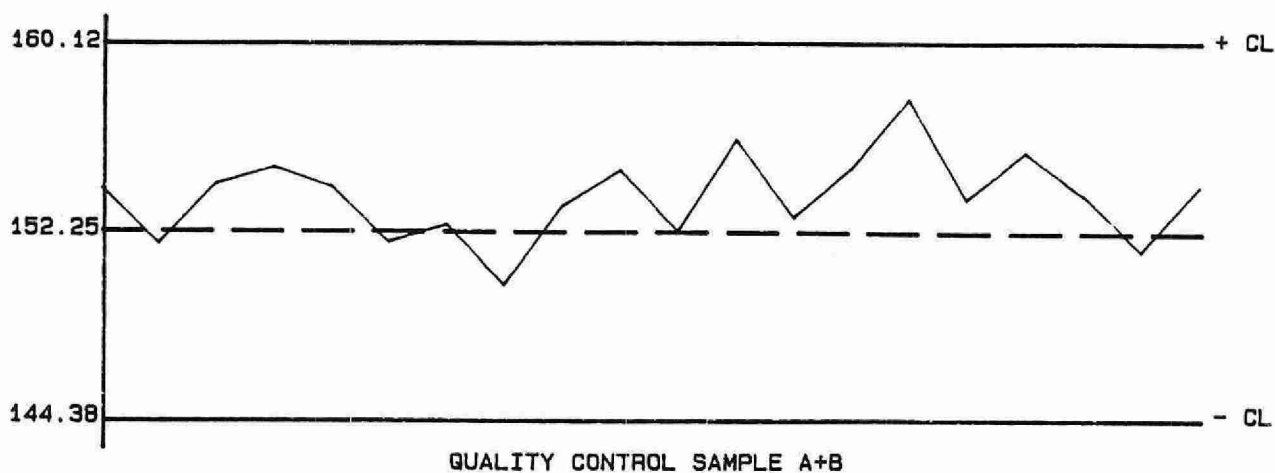
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.00 - 8.75	0.246	6.1
4	8.75 - 17.50	0.266	2.1
4	17.50 - 35.00	0.795	2.7
24	35.0 - 87.5	1.07	1.9
15	87.5 - 175.0	3.65	3.2
54	Overall	2.07	N/A

OTHER CHECKS:

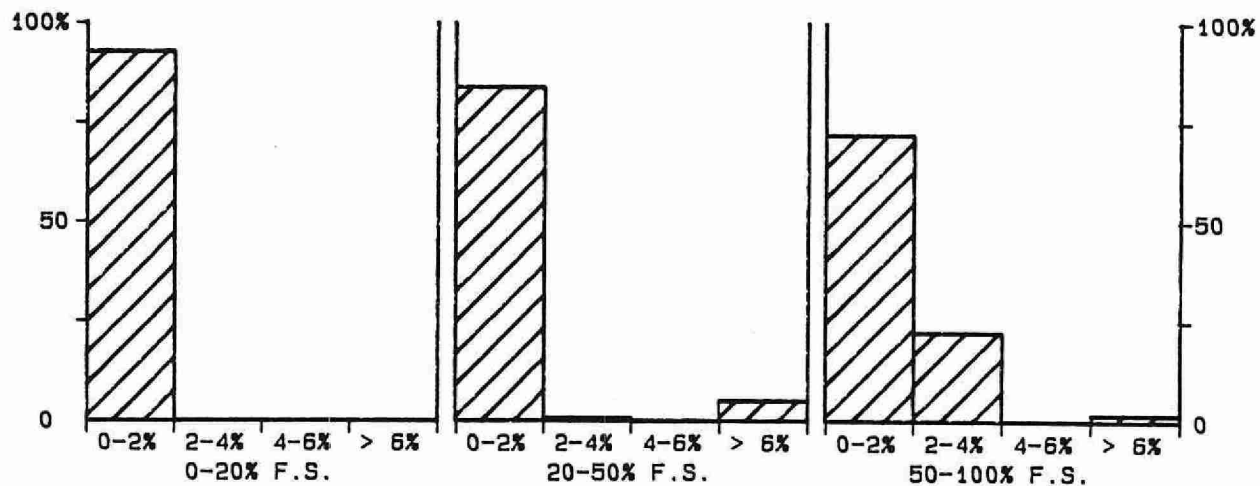
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	19	1.177	0.1012
Long Term Blank :	20	-0.00	0.205

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 06/01/87
TO: 26/02/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 175 MG/L AS CA

CALCIUM
QUALITY CONTROL DATA FROM 03/03/87 TO 29/12/87

Lab: Atomic Absorption

Analytical Range: 2.80 to 200.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	140	160.0	160.5	0.5	2.25
b :	140	40.00	40.47	0.47	0.831
a+b :	140	200.00	200.98	0.98	2.535
a-b :	140	120.00	120.04	0.04	2.252
c :	140	40.00	40.47	0.47	0.827
d :	140	10.0	10.4	0.4	0.90
c+d :	140	50.0	50.9	0.9	1.37
c-d :	140	30.0	30.1	0.1	1.05

s.d.(AB): Sw(within run): 1.59 S(between runs): 1.70 S/Sw: 1.07
s.d.(CD): Sw(within run): 0.742 S(between runs): 0.864 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

189.9 to 210.0 for A+B
113.3 to 126.7 for A-B
45.5 to 54.5 for C+D
27.0 to 33.0 for C-D

DUPLICATES:

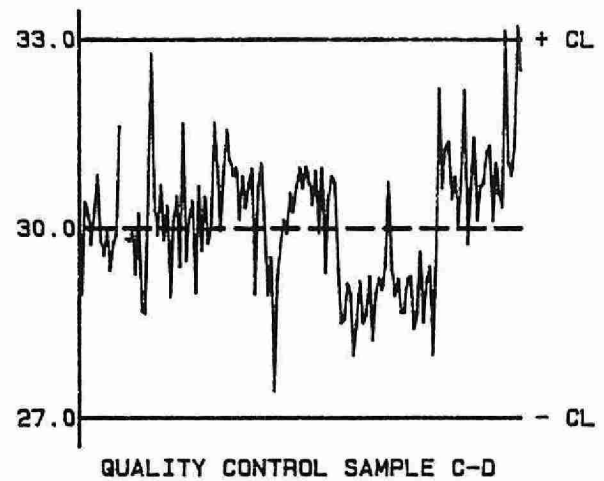
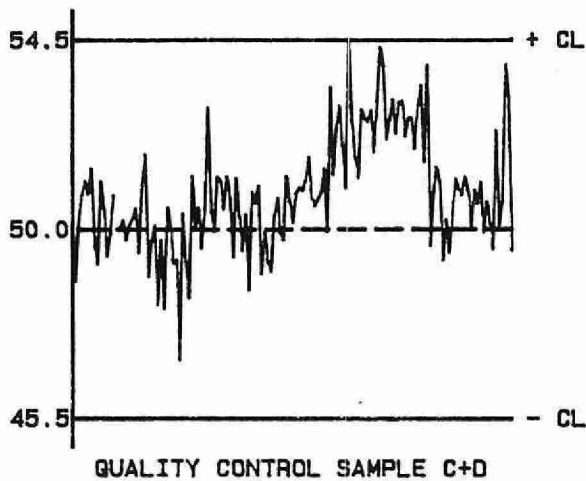
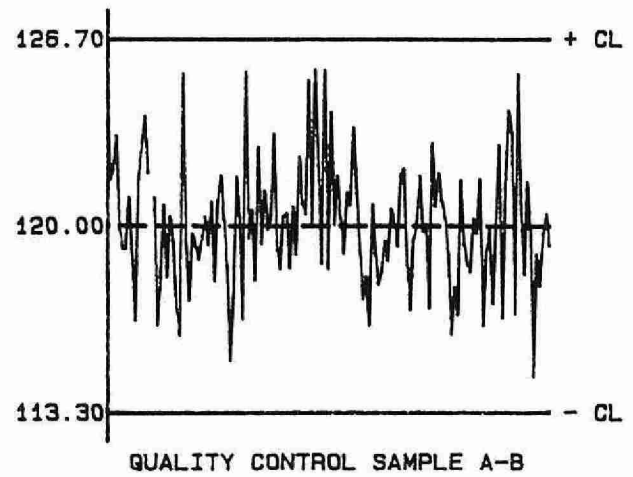
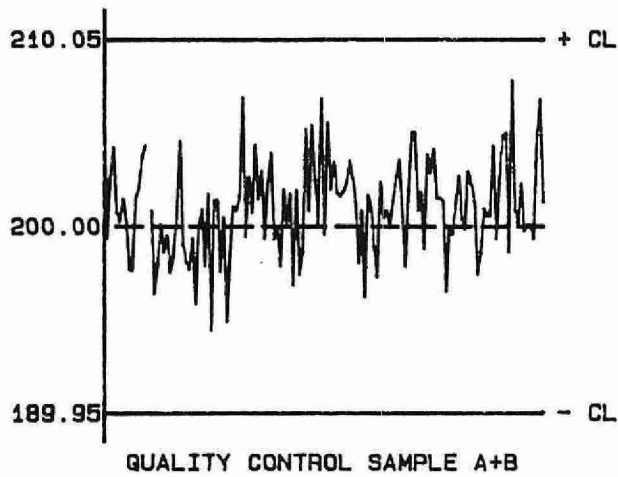
Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var.(%)
24	0.00 - 10.00	0.560	11.5
33	10.00 - 20.00	0.367	2.4
112	20.00 - 50.00	0.666	1.8
128	50.0 - 100.0	1.50	2.0
80	100.0 - 200.0	2.02	1.6
377	Overall	1.34	N/A

OTHER CHECKS:

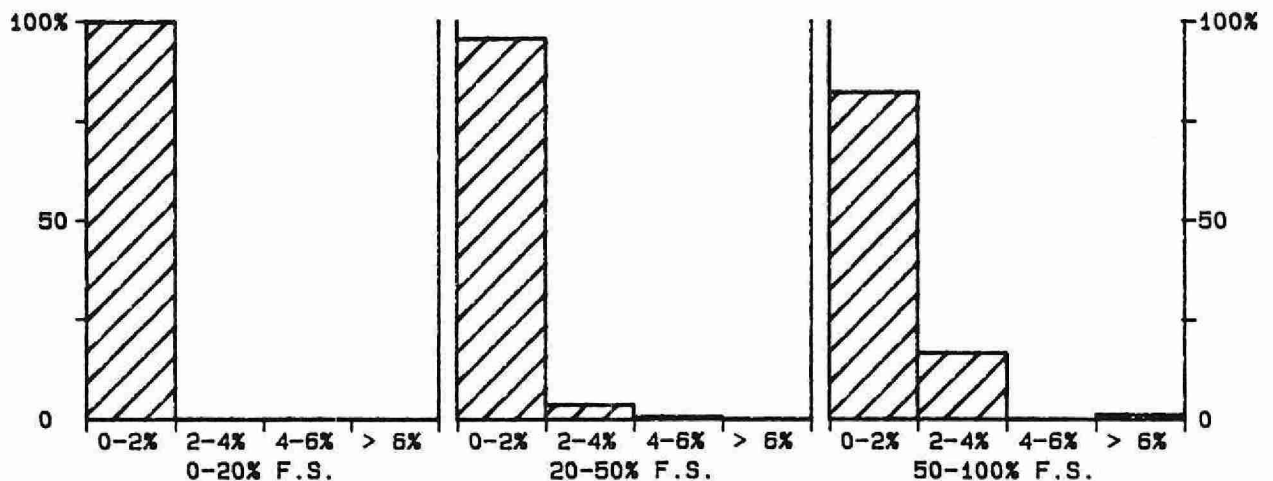
	Number of Data	Data Mean	Standard (1) Deviation
Absorbance :	138	1.149	0.0711
Long Term Blank :	128	-0.05	0.214

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 03/03/87
TO: 29/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CA

***** CALCIUM - SOIL (Xsc) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CAESC	Units	: meq/100 g Ca
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Ca by AAS at 422.7 nm with a NO₂-acetylene flames.

Approximate absorbance: 0.3 at the full scale level.

N.B. Aluminum, magnesium, and potassium are determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -three g sample used for all soil types (6 g previously used for sandy soils)
01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown - average value used.

CALCIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 07/04/87 TO 23/12/87

Lab: Dorset Soils

Analytical Range: 0.30 to 5.00 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	19	3.75	3.74	-0.01	0.073
b :	19	1.25	1.26	0.01	0.042
a+b :	19	5.00	4.99	-0.01	0.082
a-b :	19	2.50	2.48	-0.02	0.086

s.d.(AB): Sw(within run): 0.061 S(between runs): 0.060 S/Sw: 0.98

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.63 to 5.37 for A+B
2.25 to 2.75 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	19	0.22	0.19	0.039
r2 :	19	17.35	16.35	1.058
r3 :	19	2.65	2.73	0.231

DUPLICATES:

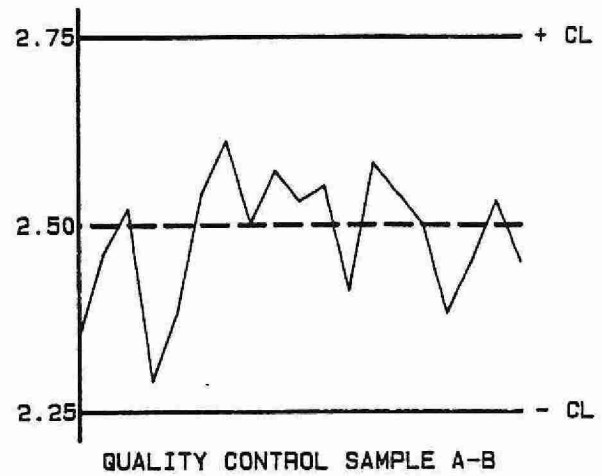
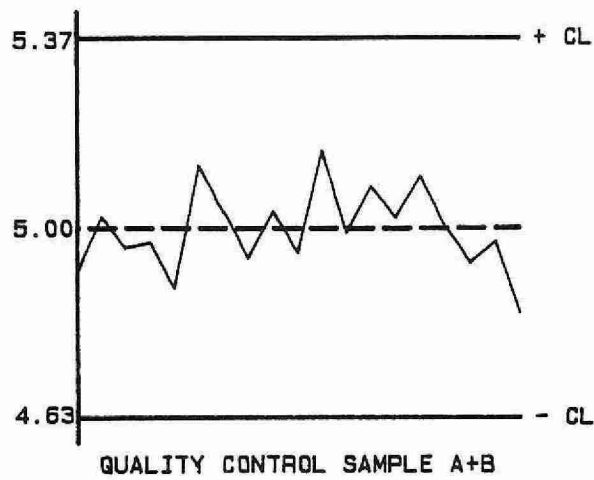
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
13	0.00 - 1.00	0.060	15.2
18	1.00 - 2.50	0.111	6.6
16	2.50 - 5.00	0.132	3.9
47	Overall	0.108	N/A

OTHER CHECKS:

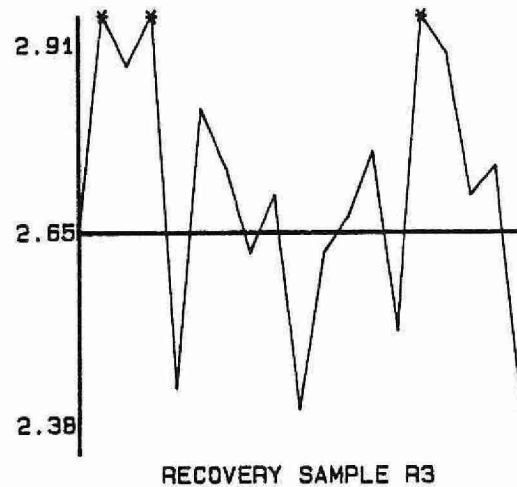
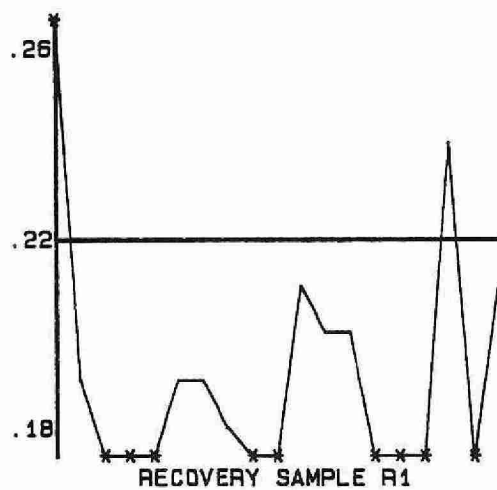
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	18	0.01	0.018

QUALITY CONTROL GRAPHS CALCIUM - SOIL (XSC) (MEQ/100G)

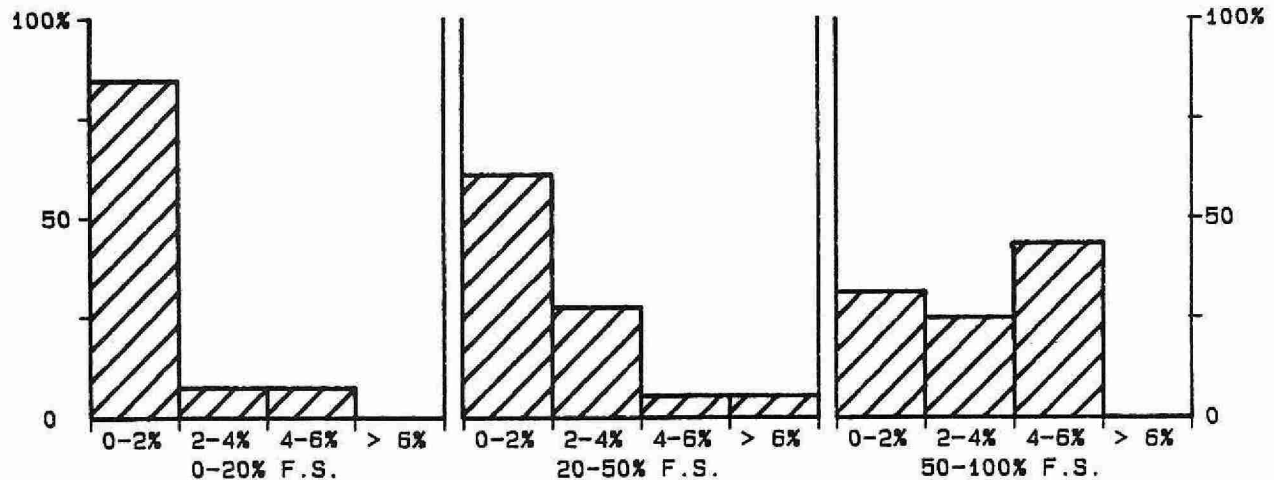
FROM: 07/04/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MEQ/100G

***** CARBON - DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
Lis Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

N.B. Dissolved organic carbon, chloride, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 1 standard daily

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

04/03/86 -Test transferred from ROC to ROM workstation. HP9920 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 1 to 7.

DISSOLVED INORGANIC CARBON
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 1.1 to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	161	32.0	32.0	0.0	0.57
b :	161	8.0	7.9	-0.1	0.30
a+b :	161	40.0	39.8	-0.2	0.76
a-b :	161	24.0	24.1	0.1	0.49
c :	158	8.0	7.9	-0.1	0.28
d :	158	2.0	1.9	-0.1	0.17
c+d :	158	10.0	9.8	-0.2	0.40
c-d :	158	6.0	6.0	0.0	0.24

s.d.(AB): Sw(within run): 0.35 S(between runs): 0.46 S/Sw: 1.31

s.d.(CD): Sw(within run): 0.17 S(between runs): 0.23 S/Sw: 1.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.2 to 41.8 for A+B
 22.8 to 25.2 for A-B
 8.2 to 11.8 for C+D
 4.8 to 7.2 for C-D

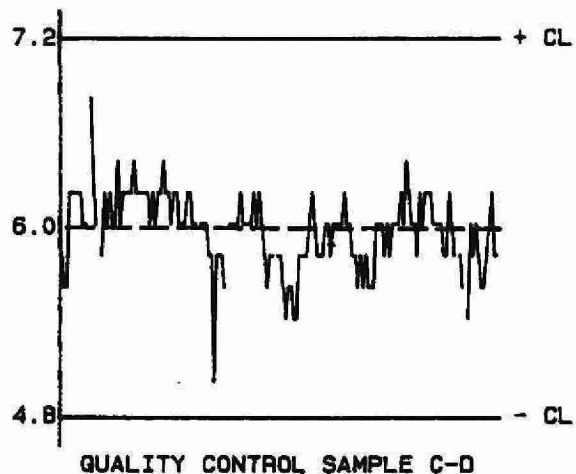
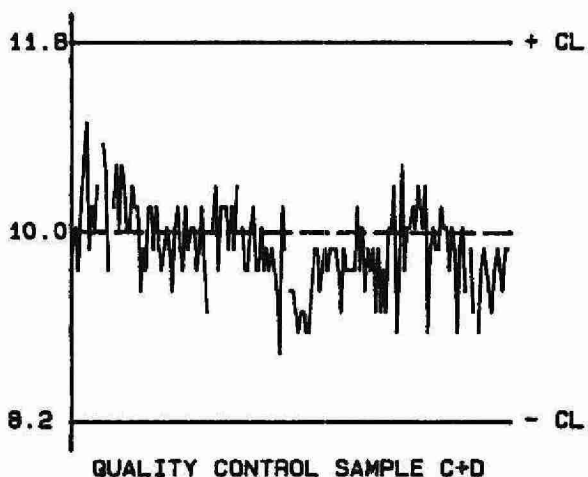
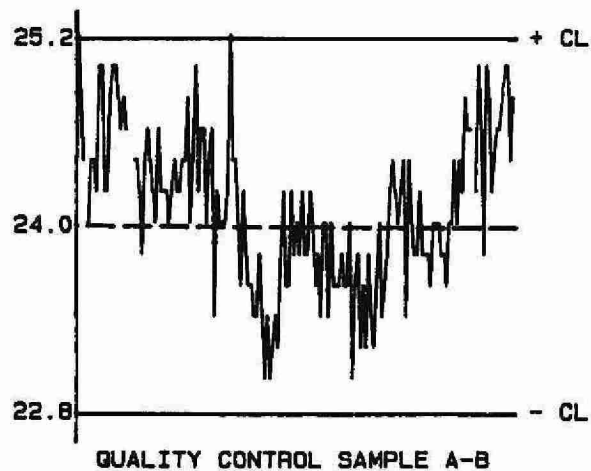
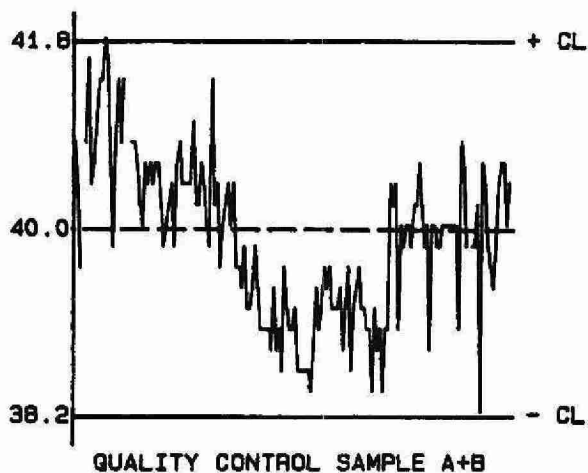
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	199	0.0 - 4.0	0.23	23.6
	19	4.0 - 8.0	0.36	6.4
	65	8.0 - 20.0	0.35	2.7
	94	20.0 - 40.0	0.50	1.8
	377	Overall	0.34	N/A

OTHER CHECKS:

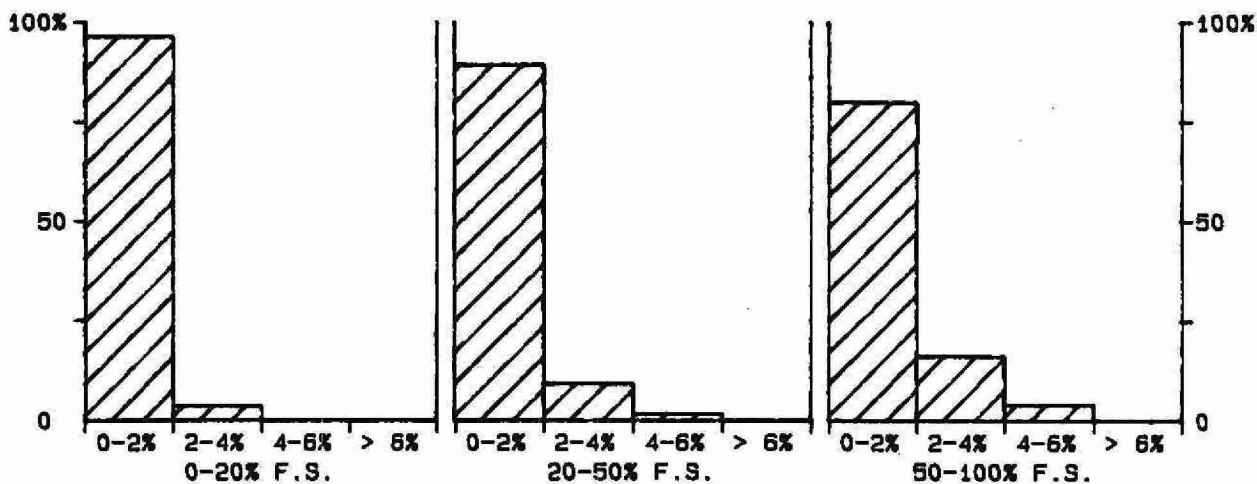
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	160	0.0	0.22

QUALITY CONTROL GRAPHS DISSOLVED INORGANIC CARBON (MG/L AS C)

FROM: 06/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** CARBON - DISSOLVED INORGANIC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 03/06/80
LIS Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Waste		

SAMPLING:

Quantity Required	: 50 mL
Container	: Pyrex culture tubes plus screw caps with cone-shape liners, completely filled with no air space.

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 1 standard daily

CONTROLS:

Calibration	: LTBL plus 4 standards, e.g. QCA, QCB, QCC, QCD
Drift	: BL every 10 samples; BL plus 1 standard every 20 samples

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on measured averages rather than expected concentrations.

CARBON - DISSOLVED INORGANIC
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Dorset

Analytical Range: 0.07 to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	119	6.8	6.8	0.0	0.13
b :	119	2.4	2.4	0.0	0.13
a+b :	119	9.2	9.2	0.0	0.20
a-b :	119	4.4	4.5	0.1	0.16
c :	119	1.51	1.51	-0.00	0.080
d :	119	0.67	0.67	-0.00	0.055
c+d :	119	2.18	2.17	-0.01	0.130
c-d :	119	0.84	0.84	0.00	0.046

s.d.(AB): Sw(within run): 0.11 S(between runs): 0.13 S/Sw: 1.15
s.d.(CD): Sw(within run): 0.033 S(between runs): 0.069 S/Sw: 2.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.6 to 9.8 for A+B
4.0 to 4.8 for A-B
1.88 to 2.48 for C+D
0.64 to 1.04 for C-D

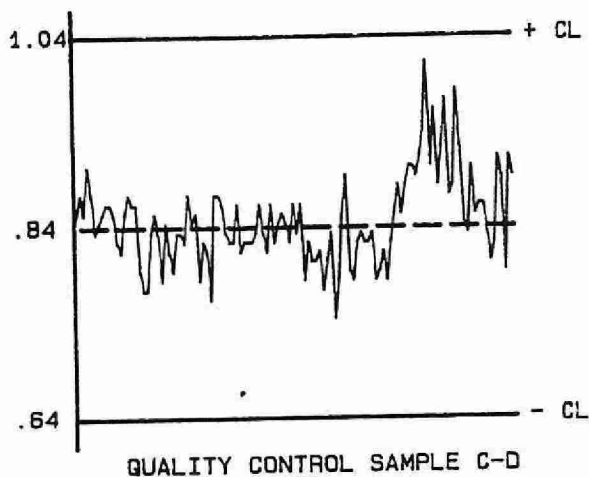
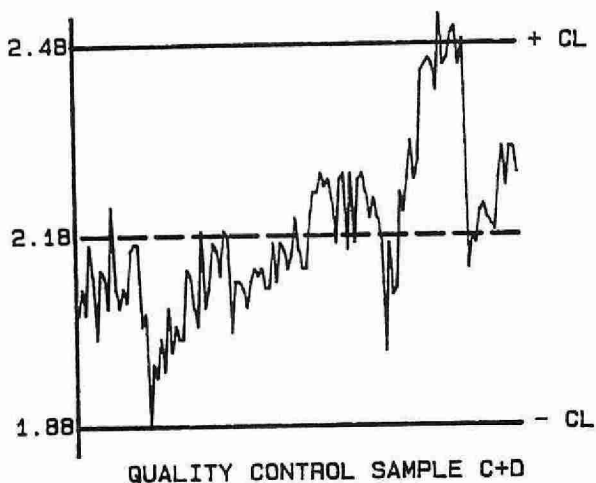
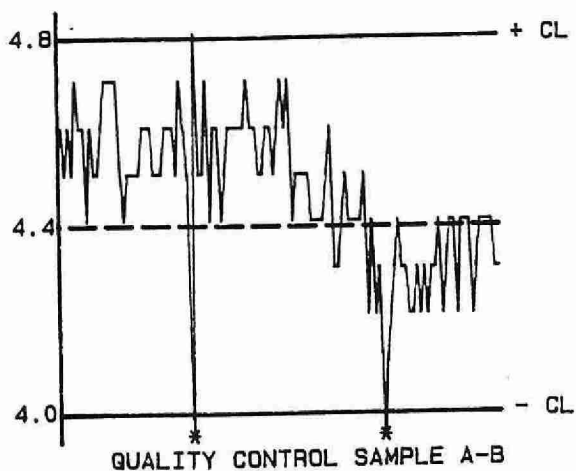
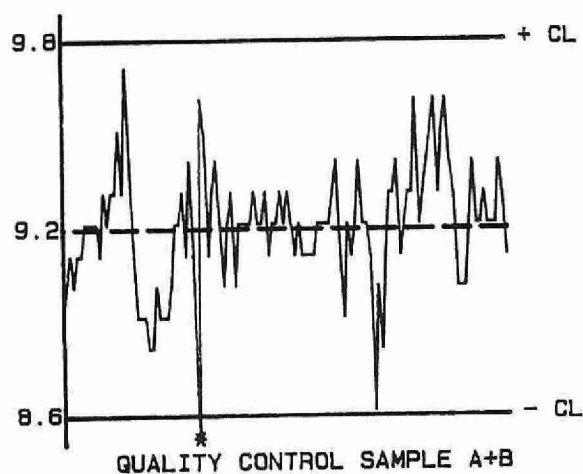
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	53	0.00 - 0.50	0.014	4.0
	86	0.50 - 1.00	0.020	2.6
	109	1.00 - 2.00	0.026	1.8
	86	2.0 - 5.0	0.05	1.7
	12	5.00 - 10.00	0.087	1.4
	346	Overall	0.035	N/A

OTHER CHECKS:

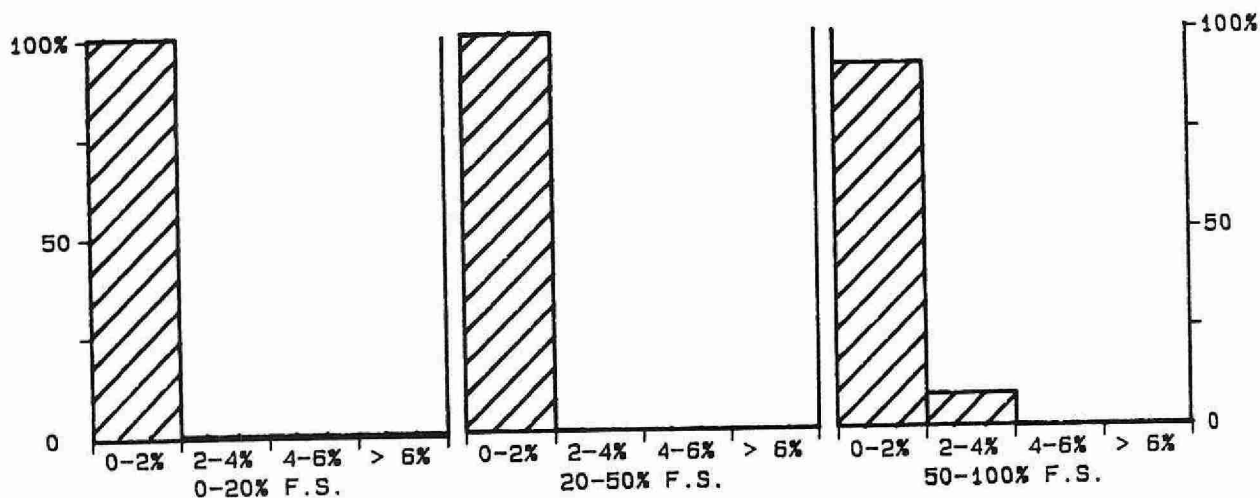
	Number of Data	Data Mean	Standard(1) Deviation
STD. CAL. :	112	313	125.9
Long Term Blank :	119	0.19	0.054

QUALITY CONTROL GRAPHS CARBON - DISSOLVED INORGANIC (MG/L AS C)

FROM: 06/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** INORGANIC CARBON - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: TIC	Units	: % dry weight as C
Work Station Code	: DOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 2 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <500 um.

ANALYTICAL PROCEDURE:

Inorganic carbon is determined by measuring the CO₂ evolved by the reaction of carbonate with hydrochloric acid in a closed system (constant temperature and pressure). The CO₂ is swept by purified air through a KI scrubber into the cathode compartment of a coulometer in which the CO₂ is absorbed by the cathode solution. It is measured by automated coulometric titration to a colourimetric endpoint.

INSTRUMENTATION:

- Coulometrics 5010 CO₂ coulometer
- Carbonate impinger train - Coulometrics
- Balance, accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CONTROLS:

Barium Carbonate (6.1%)
Sand sample, CSSC#17 soil, clay.

MODIFICATIONS:

01/09/84 -Coulometric method replaced volumetric calcimetric method.

NOTES:

Inorganic carbon is not analyzed for samples in which pH (0.01M CaCl₂) < 5.0.

CARBON - DISSOLVED INORGANIC
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Dorset

Analytical Range: 0.05 to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	119	6.8	6.8	0.0	0.13
b :	119	2.4	2.4	0.0	0.13
a+b :	119	9.2	9.2	0.0	0.20
a-b :	119	4.4	4.5	0.1	0.16
c :	119	1.51	1.51	-0.00	0.080
d :	119	0.67	0.67	-0.00	0.055
c+d :	119	2.18	2.17	-0.01	0.130
c-d :	119	0.84	0.84	0.00	0.046

s.d.(AB): Sw(within run): 0.11 S(between runs): 0.13 S/Sw: 1.15
s.d.(CD): Sw(within run): 0.033 S(between runs): 0.069 S/Sw: 2.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.6 to 9.8 for A+B
4.0 to 4.8 for A-B
1.88 to 2.48 for C+D
0.64 to 1.04 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	53	0.00 - 0.50	0.014	4.0
	86	0.50 - 1.00	0.020	2.6
	109	1.00 - 2.00	0.026	1.8
	86	2.0 - 5.0	0.05	1.7
	12	5.00 - 10.00	0.087	1.4
	346	Overall	0.035	N/A

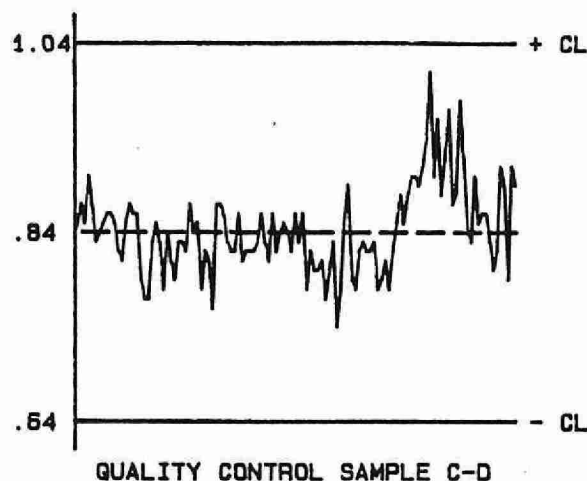
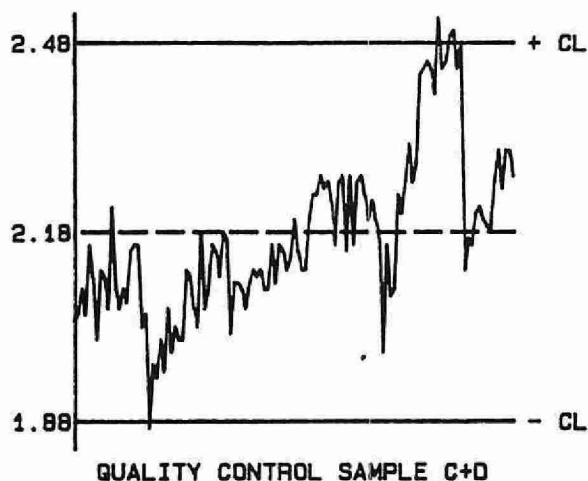
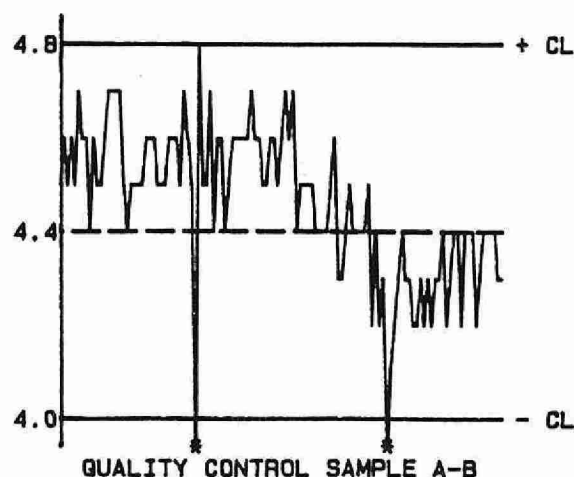
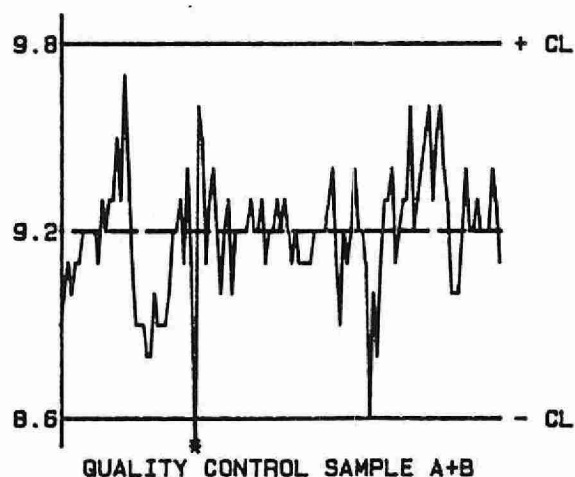
STANDARD DEVIATION (s.dup1): 0.014 W value: 0.01 T value: 0.05

OTHER CHECKS:

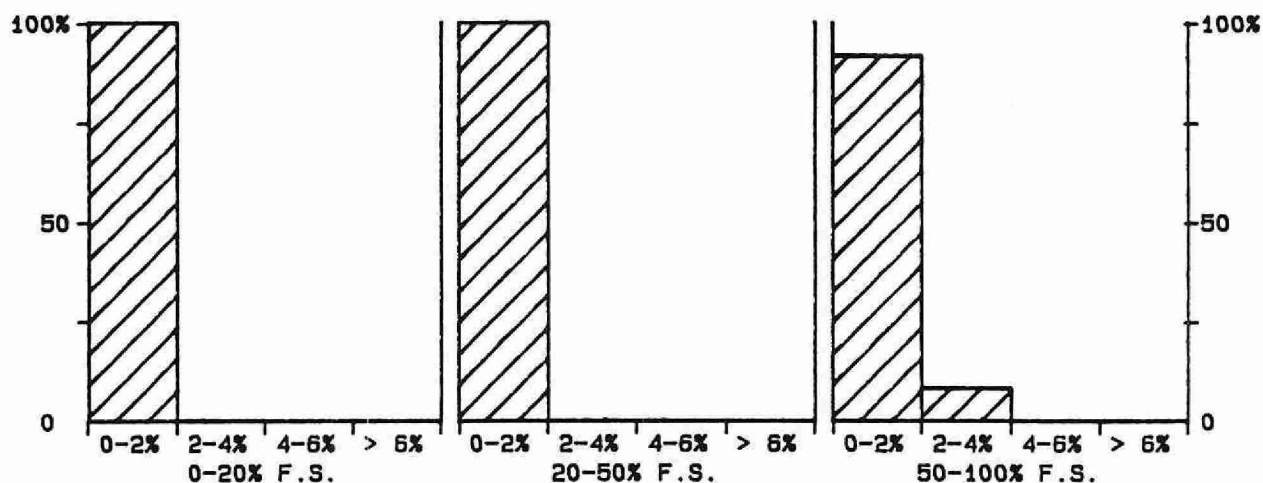
	Number of Data	Data Mean	Standard(1) Deviation
STD. CAL.	112	313	125.9
Long Term Blank	119	0.19	0.054

QUALITY CONTROL GRAPHS CARBON - DISSOLVED INORGANIC (MG/L AS C)

FROM: 06/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS C

***** CARBON - DISSOLVED ORGANIC *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water		
Supplies, Leachates, Sewages, Industrial Wastes			

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas (500 mL/min) to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light (UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

N.B. Dissolved inorganic carbon, chloride, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standard daily

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

04/03/86 -Test transferred from ROC to ROM workstation. HP9920 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 1 to 7.

DISSOLVED ORGANIC CARBON
QUALITY CONTROL DATA FROM 01/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 0.6 to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	168	16.0	16.1	0.1	0.16
b :	168	4.0	4.0	-0.0	0.10
a+b :	168	20.0	20.1	0.1	0.20
a-b :	168	12.0	12.1	0.1	0.16
c :	168	4.0	4.0	-0.0	0.10
d :	168	1.0	1.0	0.0	0.08
c+d :	168	5.0	5.0	0.0	0.15
c-d :	168	3.0	3.0	0.0	0.08

s.d.(AB): Sw(within run): 0.11 S(between runs): 0.13 S/Sw: 1.18
s.d.(CD): Sw(within run): 0.06 S(between runs): 0.09 S/Sw: 1.60

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.1 to 20.9 for A+B
11.4 to 12.6 for A-B
4.5 to 5.5 for C+D
2.7 to 3.3 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	107	0.0 - 2.0	0.12	8.3
	150	2.0 - 4.0	0.13	4.2
	161	4.0 - 10.0	0.22	3.7
	31	10.0 - 20.0	0.30	2.0
	449	Overall	0.18	N/A

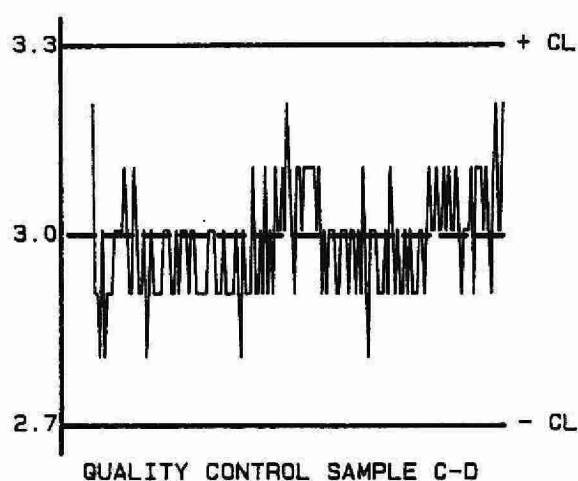
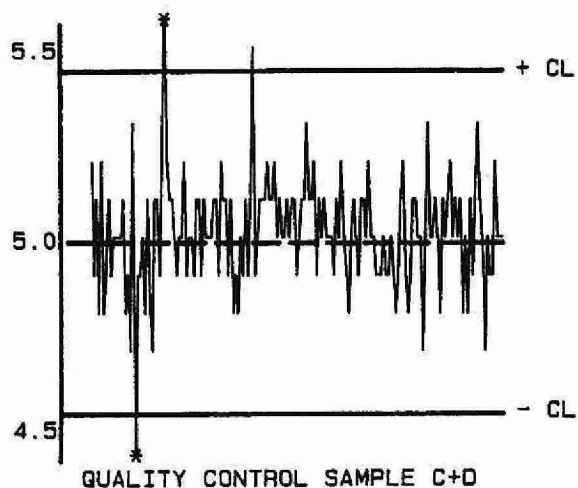
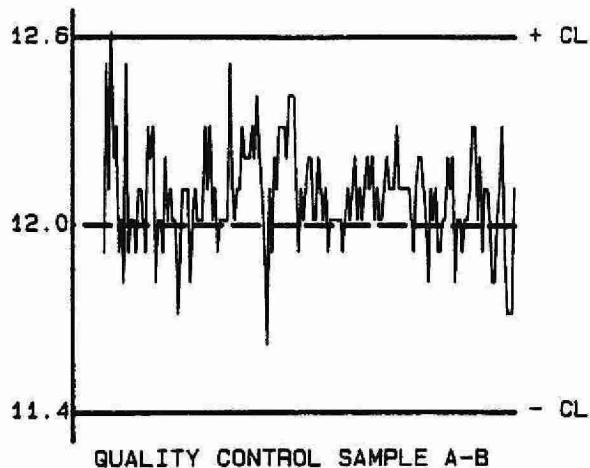
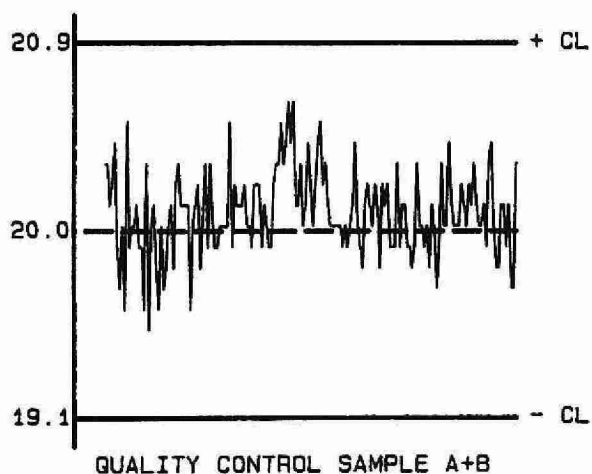
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	168	0.0	0.08

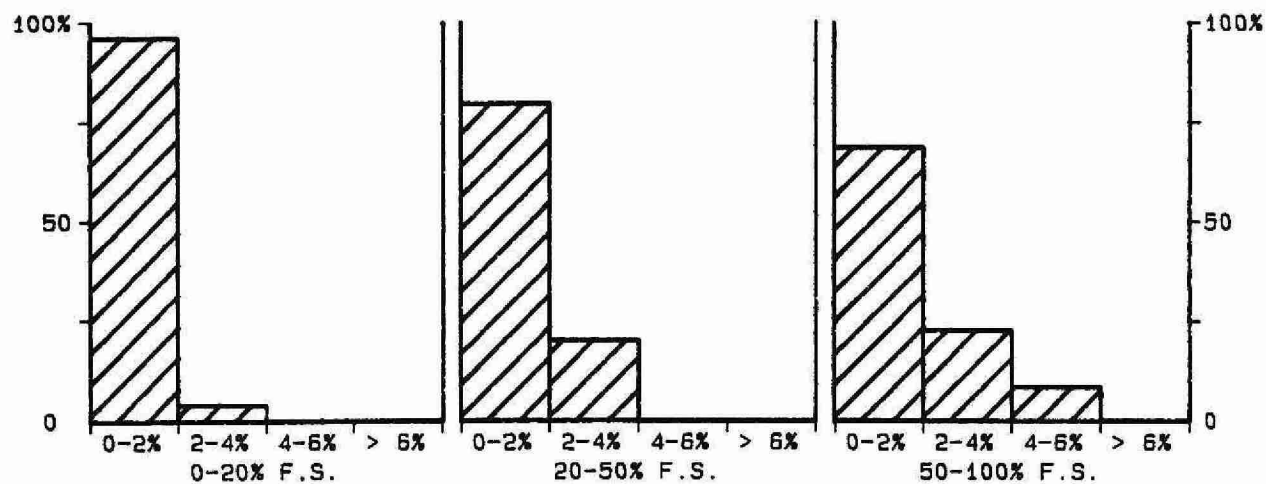
QUALITY CONTROL GRAPHS DISSOLVED ORGANIC CARBON (MG/L AS C)

FROM: 01/01/87

TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS C

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/75
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 004AC1	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically. A reference stream, from which mercuric thiocyanate has been eliminated, is utilized to compensate for sample matrix effects. Approximate absorbance: 0.5 at the full scale level.

N.B. Dissolved organic and inorganic carbon, and chloride are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm. light path at 470 N.M.

Data capture, reduction, and processing via a microcomputer system.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 7 standard

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10, and concentrations of QC standards were adjusted. The analytical rate was tripled.

12/03/86 -Boxed-FIA system discontinued. Basic air-segmented continuous flow system implemented. Test transferred from RMSICL to ROM workstation. HP9920 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 10 to 7.

23/05/86 -Second instrument set up to analyze chlorides over 50 M.G./L and samples requiring only chloride analysis. Range is 200 mg/L with approximate absorbance of 0.8 at full scale level. Performance reports for this instrument follows.

CHLORIDE
QUALITY CONTROL DATA FROM 06/01/87 TO 28/10/87

Lab: Colourimetry

Analytical Range: 0.9 to 50.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	145	40.0	40.0	-0.0	0.27
b :	145	10.0	10.0	0.0	0.18
a+b :	145	50.0	50.0	-0.0	0.36
a-b :	145	30.0	30.0	0.0	0.30
c :	145	10.0	10.0	0.0	0.18
d :	145	2.5	2.5	0.0	0.19
c+d :	145	12.5	12.5	0.0	0.33
c-d :	145	7.5	7.5	0.0	0.18

s.d.(AB): Sw(within run): 0.21 S(between runs): 0.23 S/Sw: 1.08
s.d.(CD): Sw(within run): 0.13 S(between runs): 0.19 S/Sw: 1.45

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 to 52.2 for A+B
28.5 to 31.5 for A-B
10.3 to 14.7 for C+D
6.0 to 9.0 for C-D

DUPLICATES:

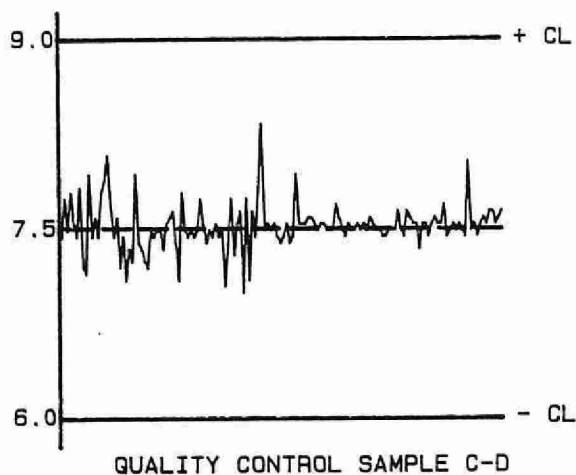
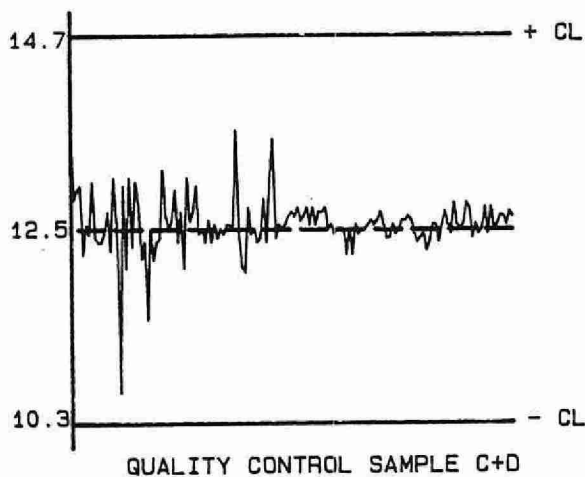
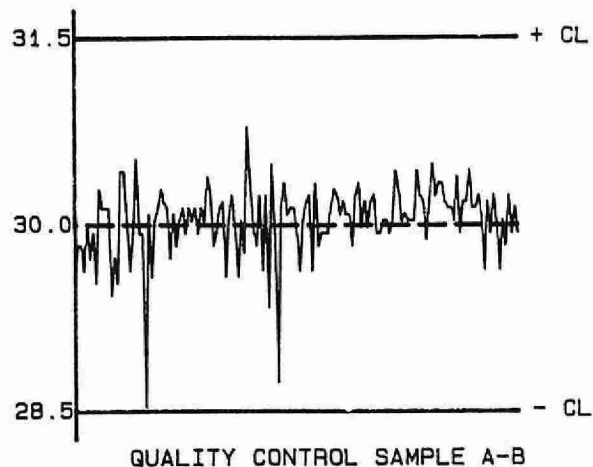
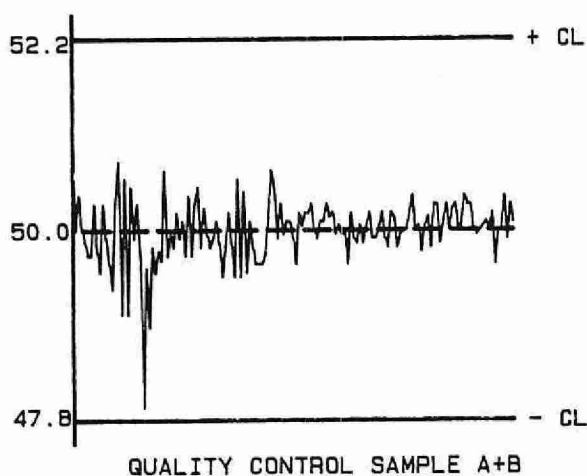
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
193	0.0 - 5.0	0.18	15.1
52	5.0 - 10.0	0.29	4.0
86	10.0 - 25.0	0.51	2.8
38	25.0 - 50.0	0.75	2.3
369	Overall	0.38	N/A

OTHER CHECKS:

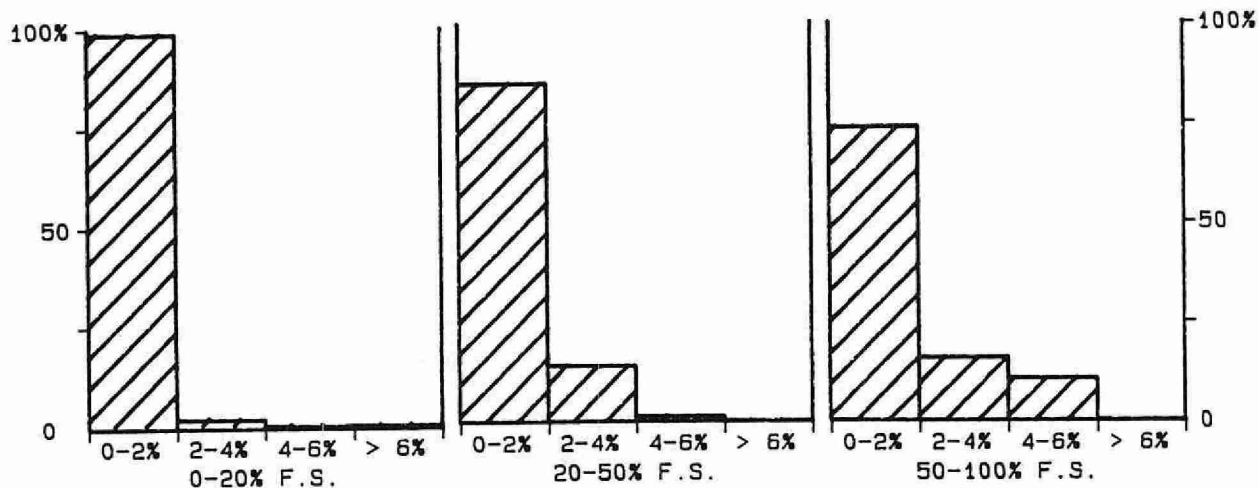
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	83	0.1	0.07

QUALITY CONTROL GRAPHS CHLORIDE (MG/L AS CL)

FROM: 06/01/87
TO: 28/10/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS CL

CHLORIDE
QUALITY CONTROL DATA FROM 22/10/87 TO 31/12/87

Lab: Colourimetry

Analytical Range: 0.4 to 100.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	40	75.0	75.5	0.5	0.31
b :	40	25.0	25.2	0.2	0.13
a+b :	40	100.0	100.7	0.7	0.39
a-b :	40	50.0	50.3	0.3	0.26
c :	37	25.0	25.2	0.2	0.11
d :	37	5.0	4.9	-0.1	0.13
c+d :	37	30.0	30.1	0.1	0.20
c-d :	37	20.0	20.3	0.3	0.15

s.d.(AB): Sw(within run): 0.18 S(between runs): 0.24 S/Sw: 1.29
s.d.(CD): Sw(within run): 0.11 S(between runs): 0.12 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

97.8 to 102.2 for A+B
48.5 to 51.5 for A-B
29.1 to 30.9 for C+D
19.4 to 20.6 for C-D

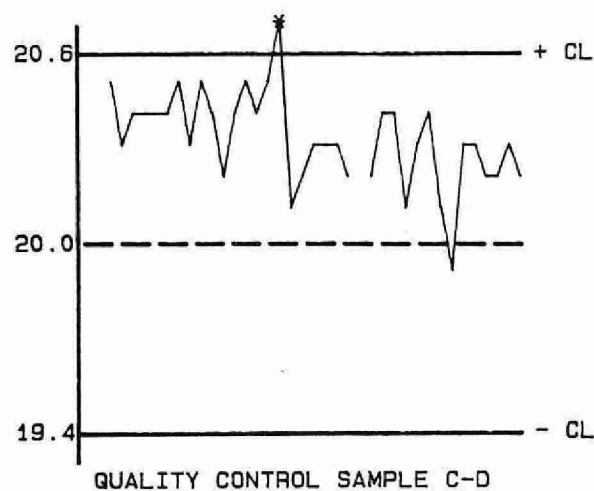
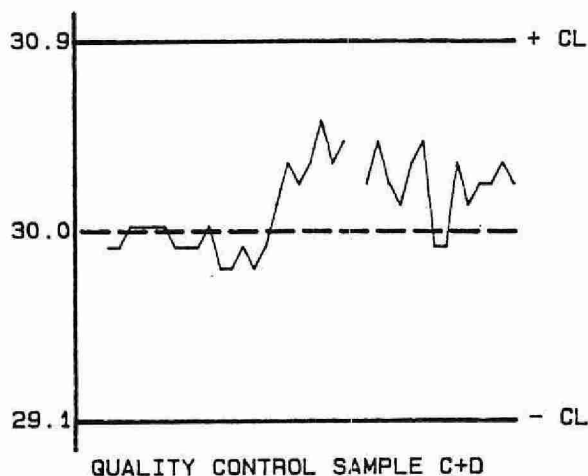
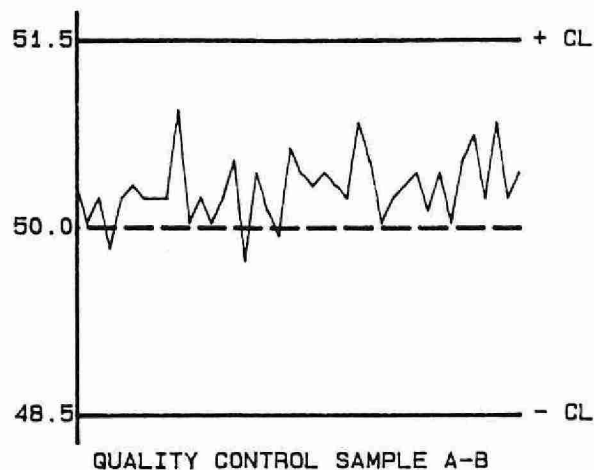
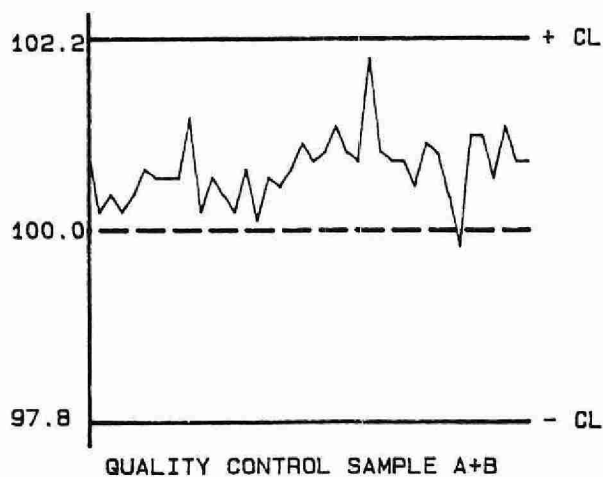
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	55	0.0 - 10.0	0.08	1.9
	31	10.0 - 20.0	0.38	2.4
	25	20.0 - 50.0	3.34	11.1
	8	50.0 - 100.0	0.52	0.9
	119	Overall	1.55	N/A

OTHER CHECKS:

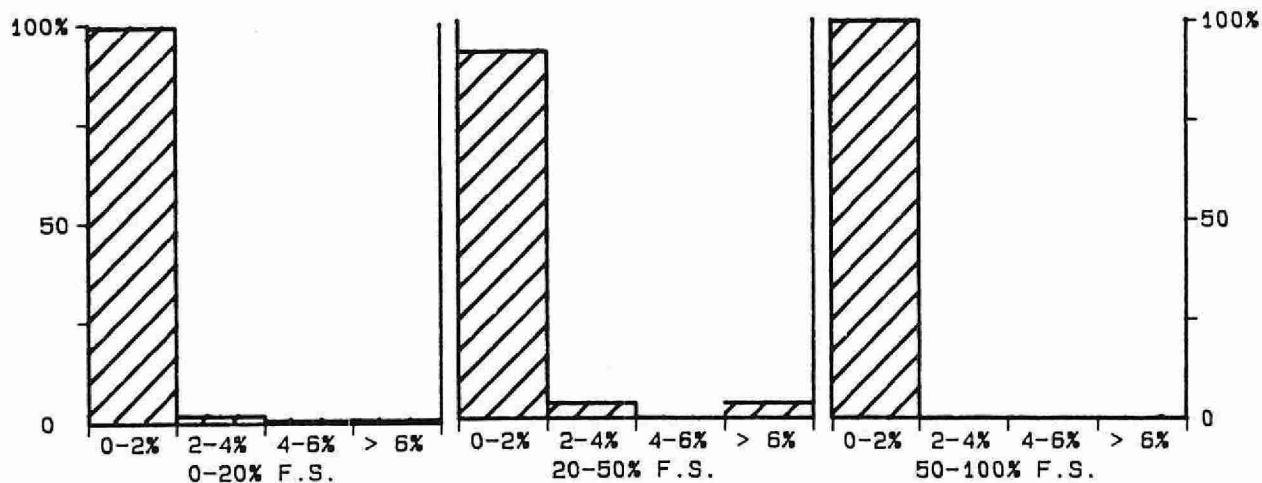
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	40	0.0	0.04

QUALITY CONTROL GRAPHS CHLORIDE (MG/L AS CL)

FROM: 22/10/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS CL

CHLORIDE
QUALITY CONTROL DATA FROM 05/01/87 TO 30/10/87

Lab: Colourimetry

Analytical Range: 1.6 to 200.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	95	160.00	160.86	0.86	0.987
b :	95	20.00	19.90	-0.10	0.244
a+b :	95	180.00	180.76	0.76	1.102
a-b :	95	140.00	140.96	0.96	0.922
c :	94	20.0	19.9	-0.1	0.24
d :	94	2.5	2.4	-0.1	0.24
c+d :	94	22.5	22.3	-0.2	0.42
c-d :	94	17.5	17.5	0.0	0.23

s.d.(AB): Sw(within run): 0.652 S(between runs): 0.719 S/Sw: 1.10
s.d.(CD): Sw(within run): 0.16 S(between runs): 0.24 S/Sw: 1.48

On any given day the calibration is accepted if the values obtained lie within the ranges:

173.7 to 186.3 for A+B
135.8 to 144.2 for A-B
18.0 to 27.0 for C+D
14.5 to 20.5 for C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
118	0.0 - 20.0	0.31	3.7
63	20.0 - 50.0	0.39	1.3
50	50.0 - 100.0	6.63	9.1
26	100.0 - 200.0	0.82	0.5
257	Overall	2.95	N/A

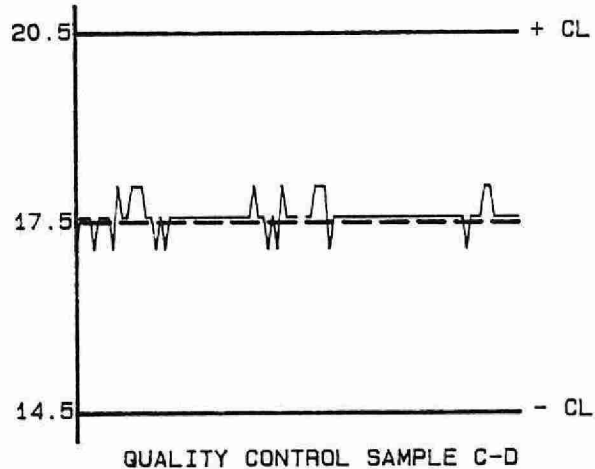
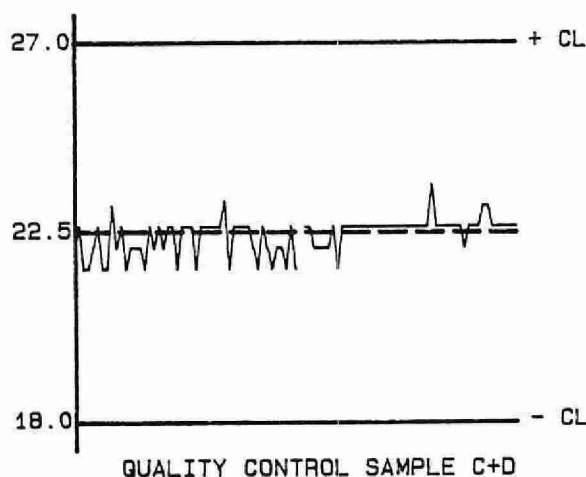
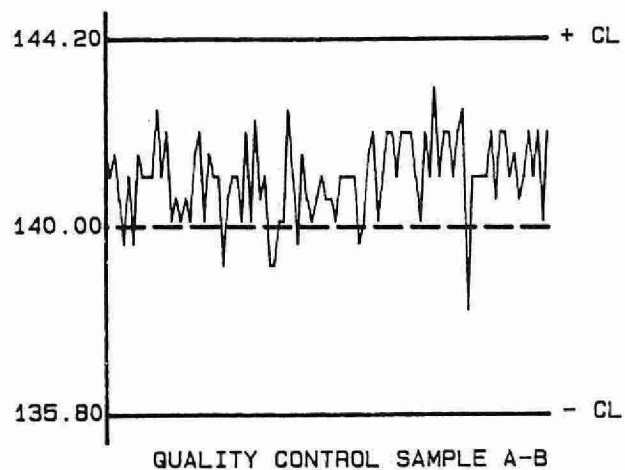
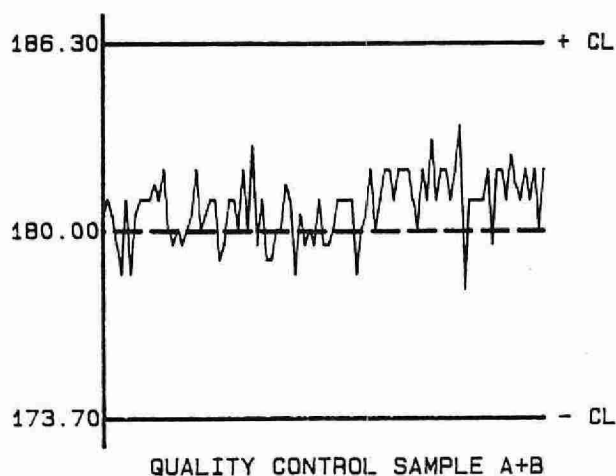
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	95	0.0	0.13

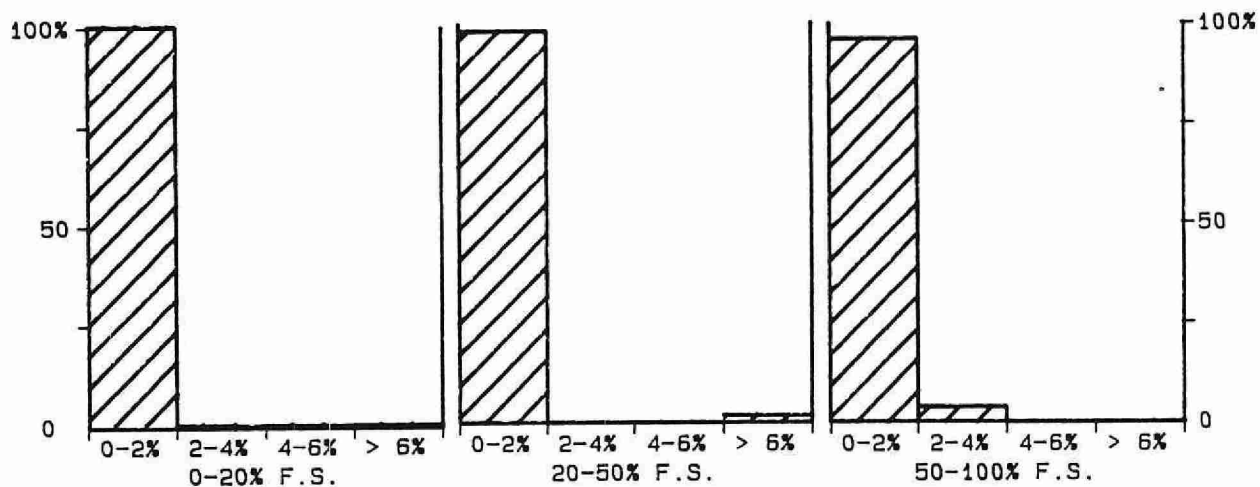
QUALITY CONTROL GRAPHS

CHLORIDE (MG/L AS CL)

FROM: 05/01/87
TO: 30/10/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CL

IDENTIFICATION:

Laboratory : Ion Chromatog
LIS Test Name Code : CLIDUR
Work Station Code : PRIC1
Method Code : 005AI0
Sample Type/Matrix : Precipitation,

Chloride
mg : 0.1
mg/L : 0.1

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene bo

ANALYTICAL PROCEDURE:

Chloride is separated from other anions chromatography using an eluent mixture of carbonate with conductivity detection. eluent strength and maintain background as Cl is determined by the comparison Full scale conductivity: 10 uS/cm. N.B. Nitrogen-nitrate and sulphate are

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U.I.

INSTRUMENTATION:

Basic modular continuous flow ion chromatography sample introduction, timing, and partial

Basic modular continuous flow ion chromatography sample introduction, timing, and partial

REPORTING:

Maximum Significant Figures: 3

0.1 mg/L

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 s

MODIFICATIONS:

20/09/84 -Chloride range was changed
12/04/85 -Chloride quality control standard from 0.30 to 0.40 mg/L. First three methods comparable with the later ones.
01/04/86 -Varian Spectrex Model 4270 used to calculate preliminary sample manually corrected for in-run sensitivity

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CHLORIDE
QUALITY CONTROL DATA FROM 06/01/87 TO 30/12/87

Lab: Ion Chromatography

Analytical Range: 0.08 to 2.00 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	82	1.60	1.60	0.00	0.017
b :	82	0.40	0.40	0.00	0.013
a+b :	82	2.00	2.01	0.01	0.024
a-b :	82	1.20	1.20	0.00	0.019

s.d.(AB): Sw(within run): 0.013 S(between runs): 0.015 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

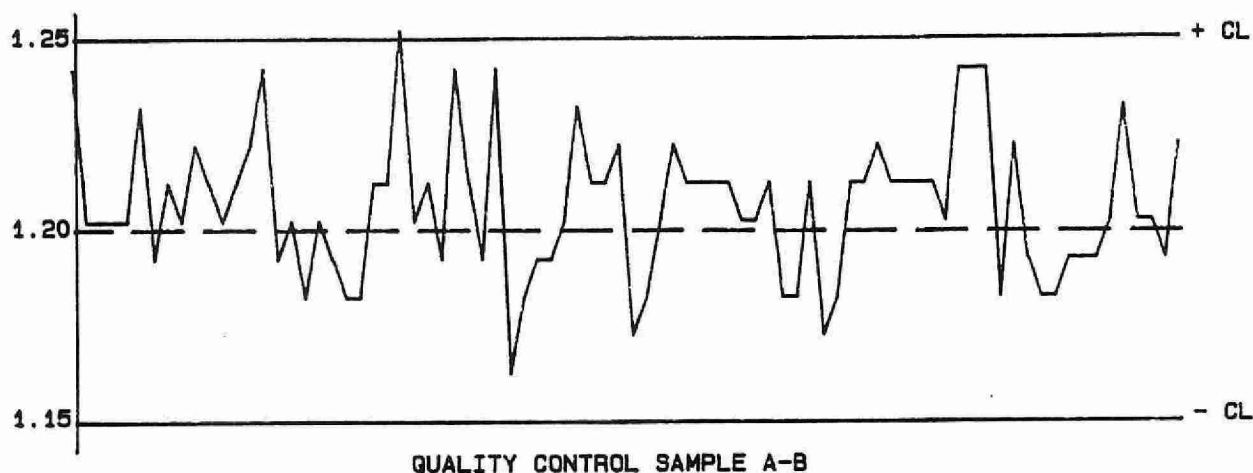
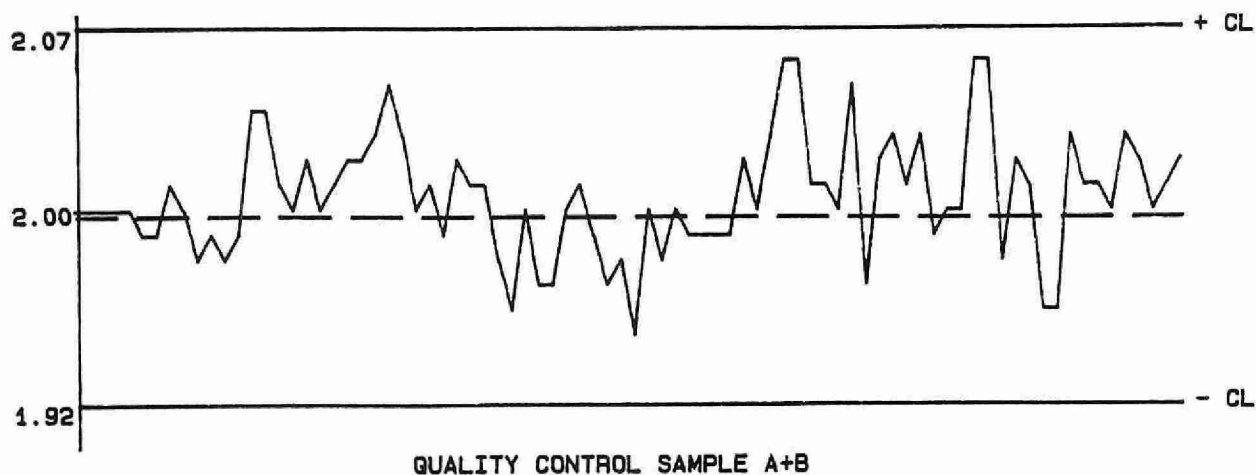
1.92 to 2.07 for A+B
1.15 to 1.25 for A-B

DUPLICATES:

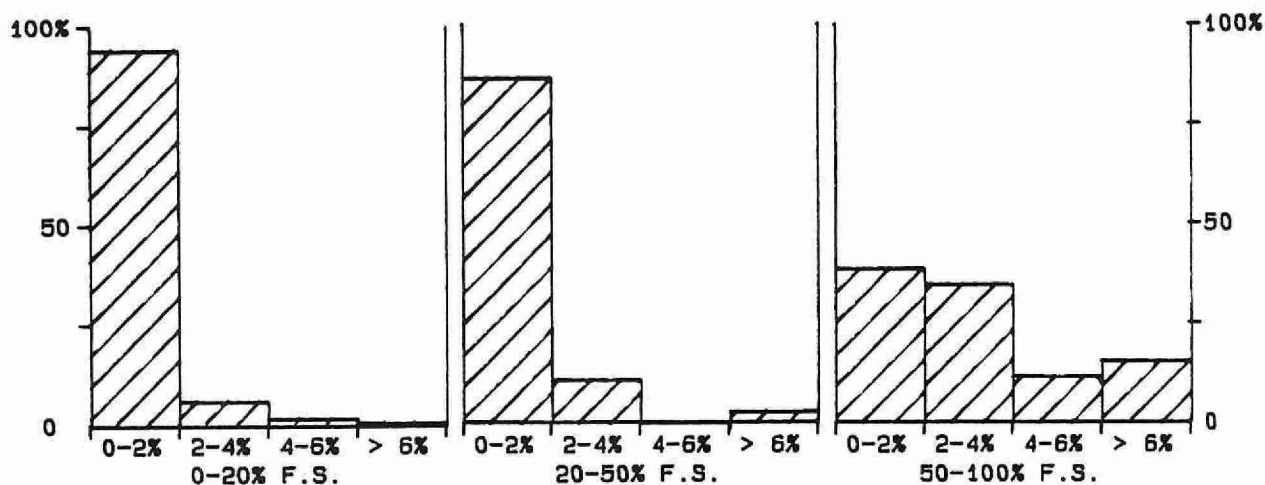
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
60	0.00 - 0.20	0.015	19.8
47	0.20 - 0.50	0.015	4.1
22	0.50 - 1.00	0.119	16.9
17	1.00 - 2.00	0.053	4.0
146	Overall	0.051	N/A

QUALITY CONTROL GRAPHS CHLORIDE (MG/L AS CL)

FROM: 06/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS CL

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: ug/Filter as Cl
Work Station Code	: PRLOV	Unit Code	: 361960
Method Code	: 004AIC	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as Cl.
Full scale conductivity: 30 uS/cm.
N.B. Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ was introduced.
20/09/84 -Chloride range was changed from 1.50 mg/L full scale to 2.00 mg/L full scale. Quality control standards were not changed.
12/04/85 -Chloride quality control standards were changed; QCA from 1.20 to 1.60 mg/L and QCB from 0.30 to 0.40 mg/L. First three months' data were omitted because they were not comparable with the later ones.
10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

CHLORIDE
QUALITY CONTROL DATA FROM 02/01/87 TO 22/12/87

Lab: Ion Chromatography Analytical Range: 3.9 to 100.0 ug/Filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	24	80.0	80.5	0.5	0.76
b :	24	20.0	19.8	-0.2	0.78
a+b :	24	100.0	100.2	0.2	1.28
a-b :	24	60.0	60.7	0.7	0.86

s.d.(AB): Sw(within run): 0.61 S(between runs): 0.77 S/Sw: 1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

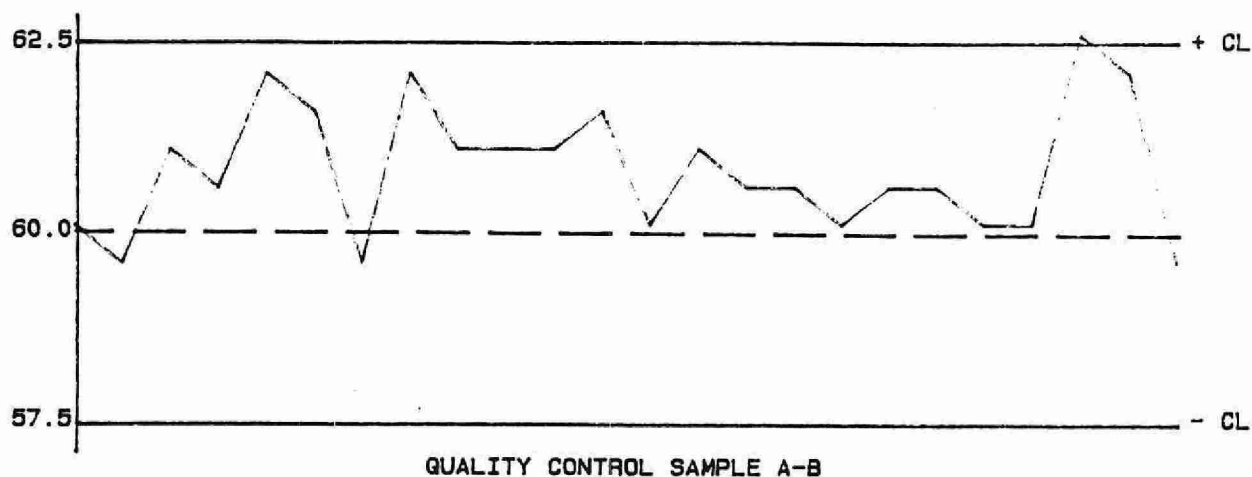
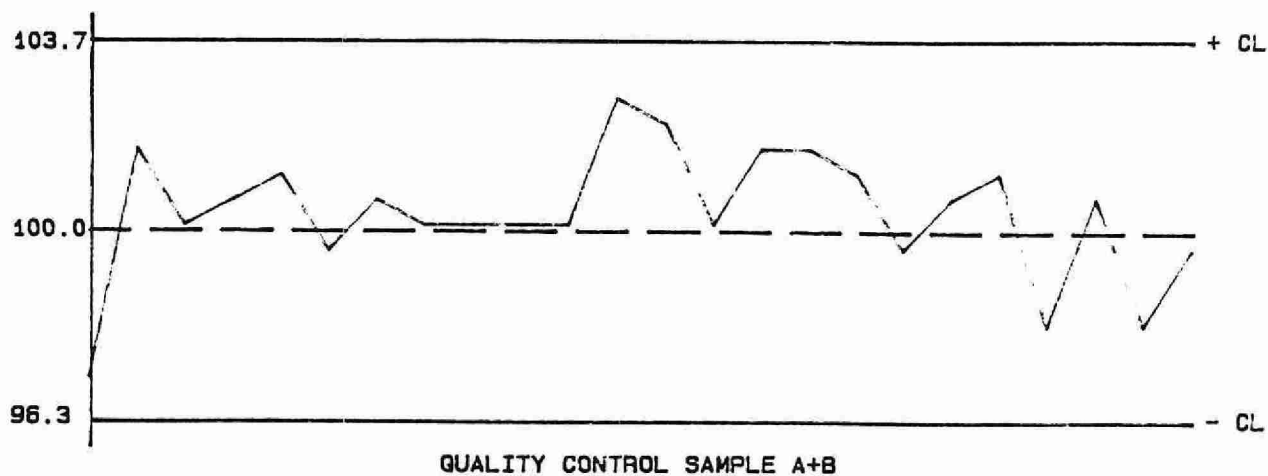
96.3 to 103.7 for A+B
57.5 to 62.5 for A-B

DUPLICATES:

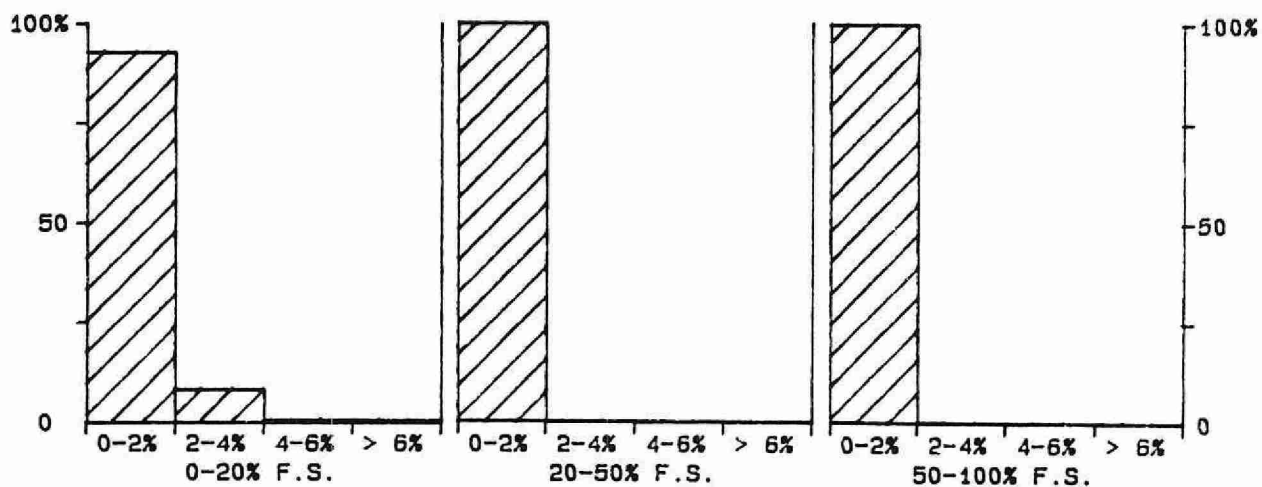
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
13	0.0 - 15.0	0.78	9.9
4	15.0 - 37.5	0.43	1.7
3	37.5 - 100.0	0.61	0.8
20	Overall	0.70	N/A

QUALITY CONTROL GRAPHS CHLORIDE (UG/FILTER AS CL)

FROM: 02/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/FILTER AS CL

***** CHLOROPHYLL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/75
LIS Test Name Code	: CHLRAT,CHLRBT,CHLRAC	Units	: ug/L
Work Station Code	: RCHLO	Unit Code	: 06300
Method Code	: 002052	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Effluents,		

SAMPLING:

Quantity Required : 1000 mL
Container : Glass or plastic
Other : In the field a sample is filtered through a nylon filter. The filter is then placed between two membrane filter-support pads, and the package is enclosed in a plastic dish.

ANALYTICAL PROCEDURE:

Using a Commodore PET microcomputer-controlled, automated spectrophotometer, two scans are developed with absorbance measurements at 630, 645, and 663 nm for the first scans; the minimum absorbance value between 710 and 750 nm (readings at 5 nm intervals) is utilized as a turbidity correction. Chlorophyll a and b are calculated from this scan. After automated acidification, the second scan is obtained from the wavelengths 630, 645, 665 nm for calculating chlorophyll a, corrected. SCOR-UNESCO equations are used for all chlorophyll calculations.

INSTRUMENTATION:

- Automated modular continuous flow scanning spectrophotometer system
- Microcomputer system for control of sampling, timing and data processing (i.e. data capture, calculations and transfer of results to LIS)

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2,0.1,1 T value:1,0.5,5

CONTROLS:

Calibration : LTBL plus 2 "standards", e.g. QCA
Drift : "standard", BL every 20 samples

MODIFICATIONS:

01/07/85 -Automated, microcomputer controlled system was introduced.
13/06/85 -Centrifuging steps were eliminated and nylon filters were introduced.
02/11/86 -Test suspended, all subsequent analysis now being done through privatization.

NOTES:

In 1982 calibration controls were stable, but were prepared from dyes rather than chlorophyll. "Standards" are now prepared from chlorophyll a and b, but the materials are neither analytical grade nor are their solutions stable. Thus calibration controls are based on measured averages.
21/11/86 -Test suspended, all subsequent analysis now being done through privatization.

CHLOROPHYLL - a
QUALITY CONTROL DATA FROM 06/01/87 TO 08/12/87

Lab: Colourimetry

Analytical Range: 0.66 to 10.00 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	74	3.06	3.03	-0.03	0.117
b :	74	1.02	1.07	0.05	0.075
a+b :	74	4.08	4.10	0.02	0.167
a-b :	74	2.04	1.95	-0.09	0.102

s.d.(AB): Sw(within run): 0.072 S(between runs): 0.098 S/Sw: 1.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.18 to 4.98 for A+B
 1.44 to 2.64 for A-B

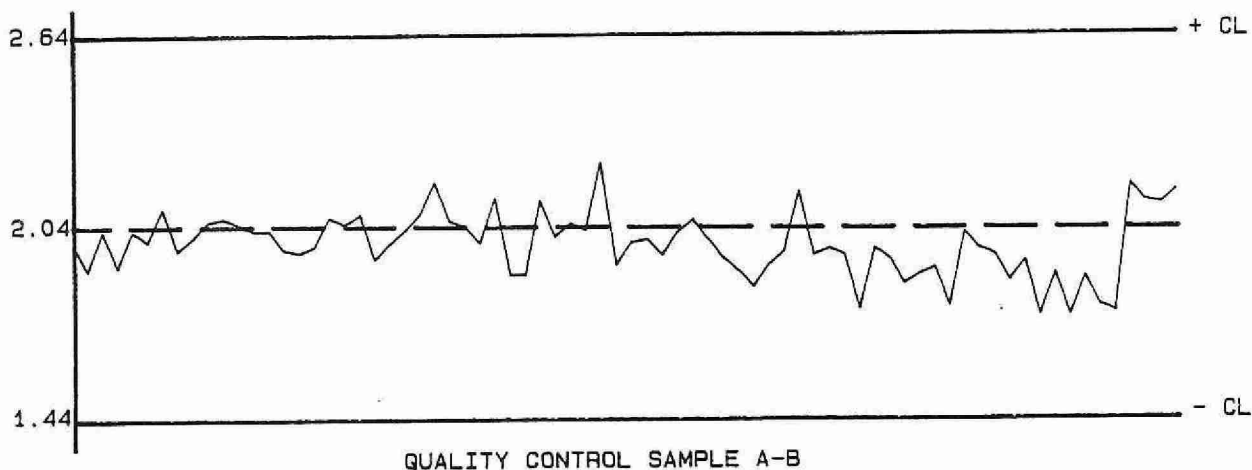
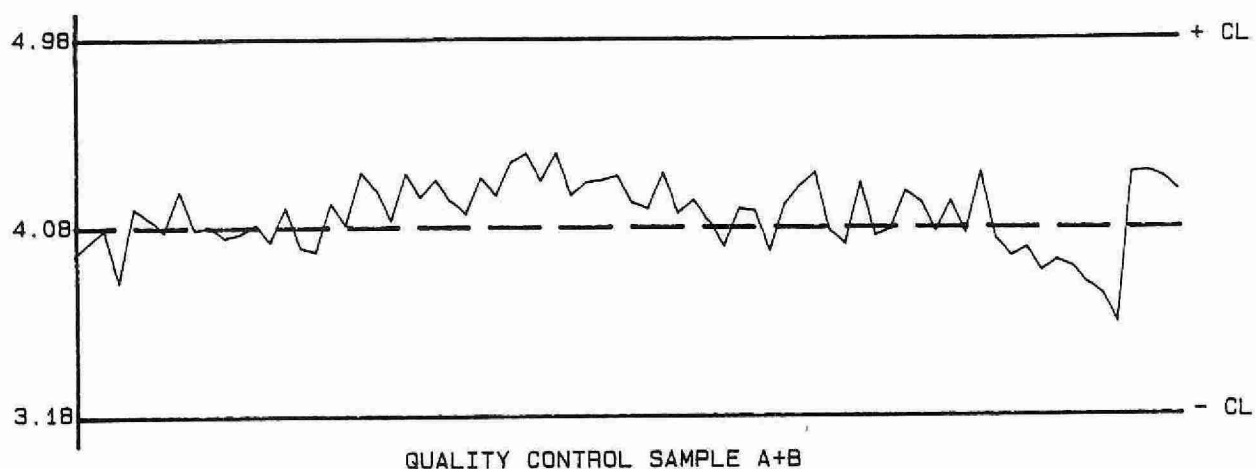
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	3	0.00 - 2.00	0.132	10.6
	0	2.00 - 5.00	N/A	N/A
	2	5.00 - 10.00	0.366	6.2
	5	Overall	0.253	N/A

OTHER CHECKS:

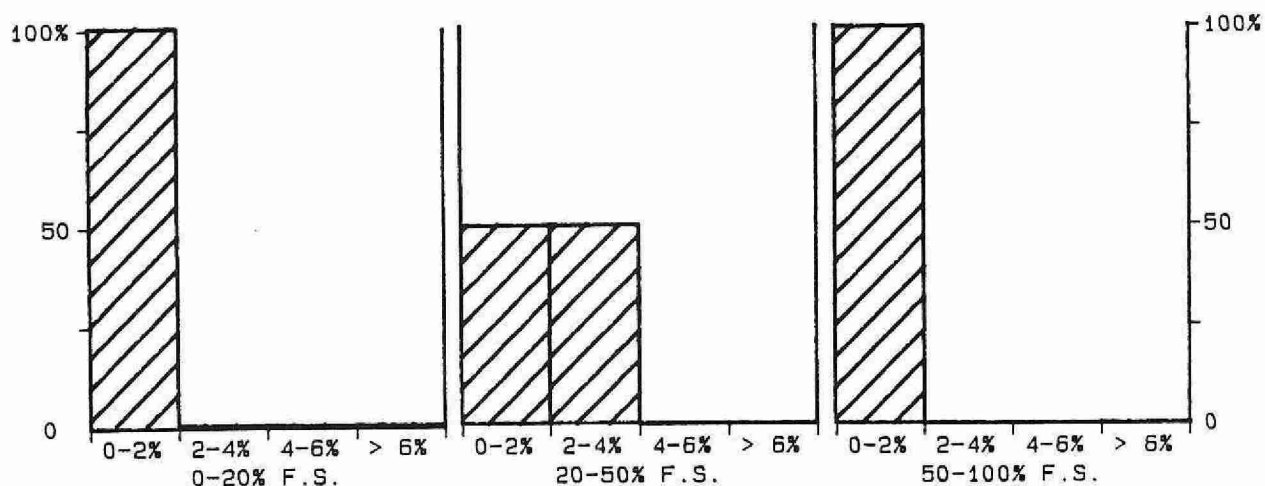
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	73	0.05	0.042
Digested Blank :	73	0.06	0.054

QUALITY CONTROL GRAPHS CHLOROPHYLL - A (UG/L)

FROM: 06/01/87
TO: 08/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 UG/L

CHLOROPHYLL - b
QUALITY CONTROL DATA FROM 06/01/87 TO 25/08/87

Lab: Colourimetry

Analytical Range: 0.74 to 10.00 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	4	3.06	3.11	0.04	0.123
b :	4	1.02	1.07	0.05	0.138
a+b :	4	4.08	4.18	0.10	0.253
a-b :	4	2.04	2.03	-0.01	0.063

s.d.(AB): Sw(within run): 0.045 S(between runs): 0.131 S/Sw: 2.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.63 to 4.53 for A+B
 1.74 to 2.34 for A-B

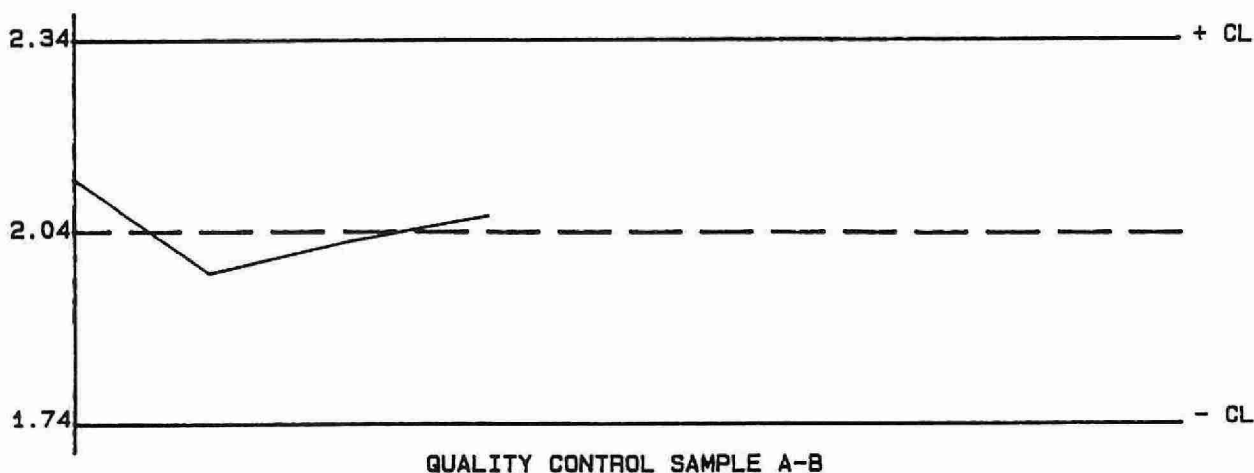
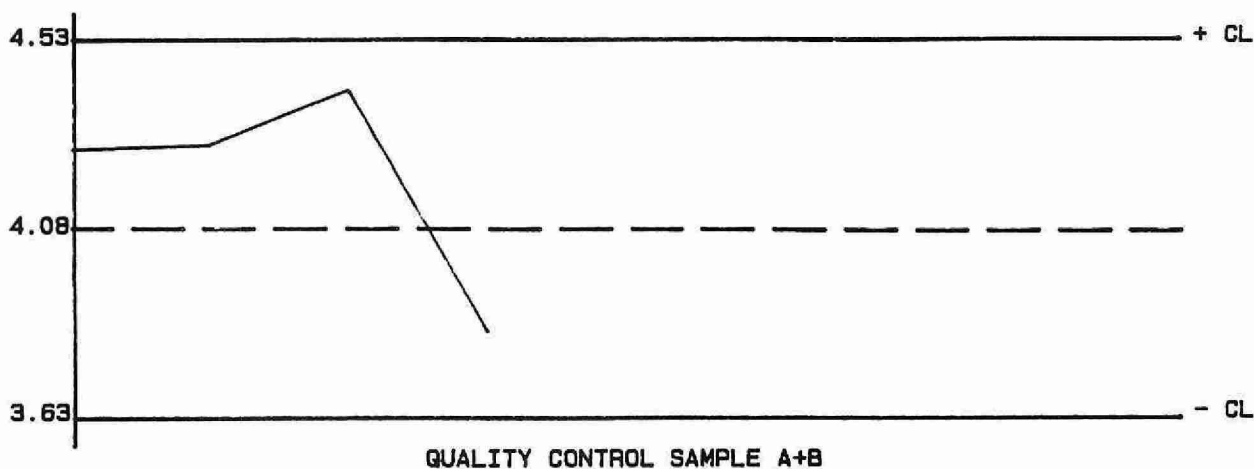
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	6	0.00 - 2.00	0.148	21.9
	0	2.00 - 5.00	N/A	N/A
	0	5.00 - 10.00	N/A	N/A
	6	Overall	0.148	N/A

OTHER CHECKS:

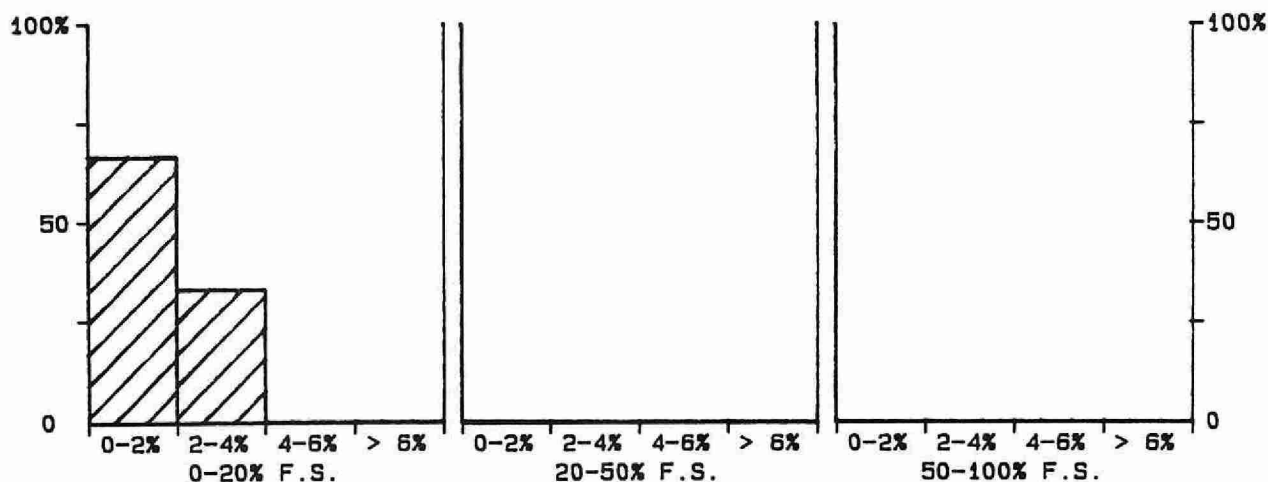
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	4	0.03	0.048
Digested Blank :	4	0.01	0.127

QUALITY CONTROL GRAPHS CHLOROPHYLL - B (UG/L)

FROM: 06/01/87
TO: 25/08/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** CLAY *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CLAY	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of clay in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (model 1201)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus
a round robin CSSC sample

NOTES:

Two recovery soils are alternated between batches, using their mean values.

CLAY
QUALITY CONTROL DATA FROM 12/01/87 TO 11/07/87

Lab: Dorset Soils

Analytical Range: 8 to 100 % by wt.

RECOVERIES:

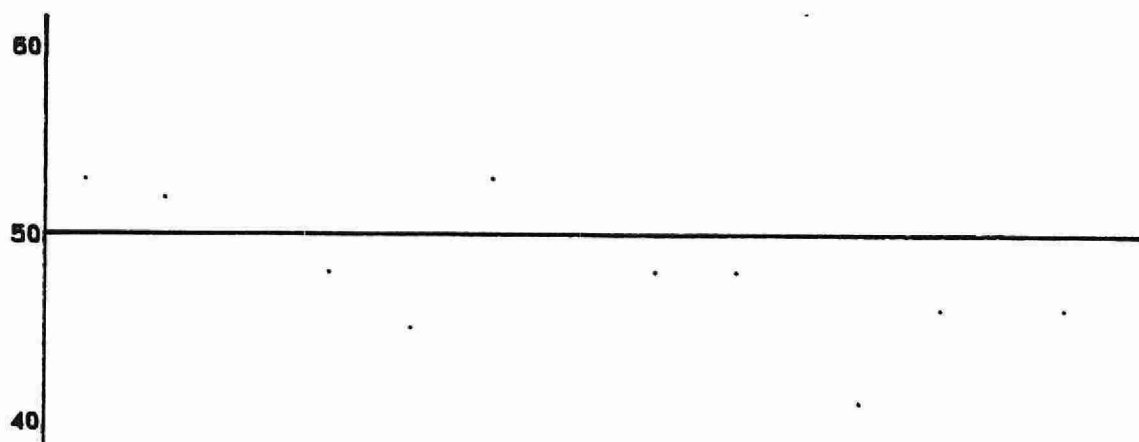
	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
r1 :	11	50	48	3.7
r2 :	13	2	4	1.5

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
22	0 - 20	1.5	20.7
5	20 - 50	1.9	5.6
0	50 - 100	N/A	N/A
27	Overall	1.6	N/A

QUALITY CONTROL GRAPHS CLAY (% BY WT.)

FROM: 12/01/87
TO: 11/07/87

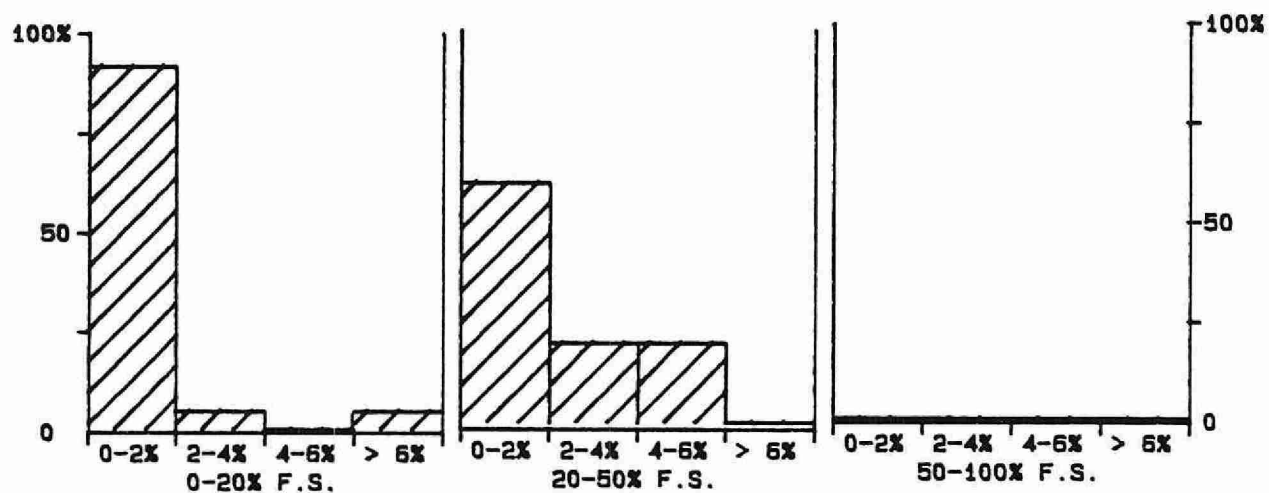


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

CLAY
QUALITY CONTROL DATA FROM 16/10/87 TO 21/12/87

Lab: Dorset Soils

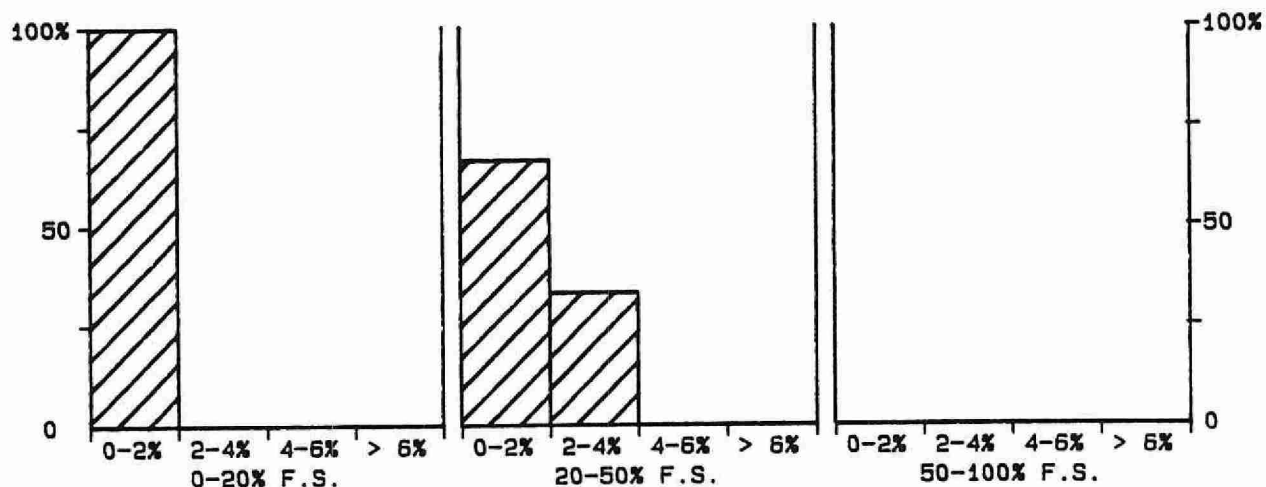
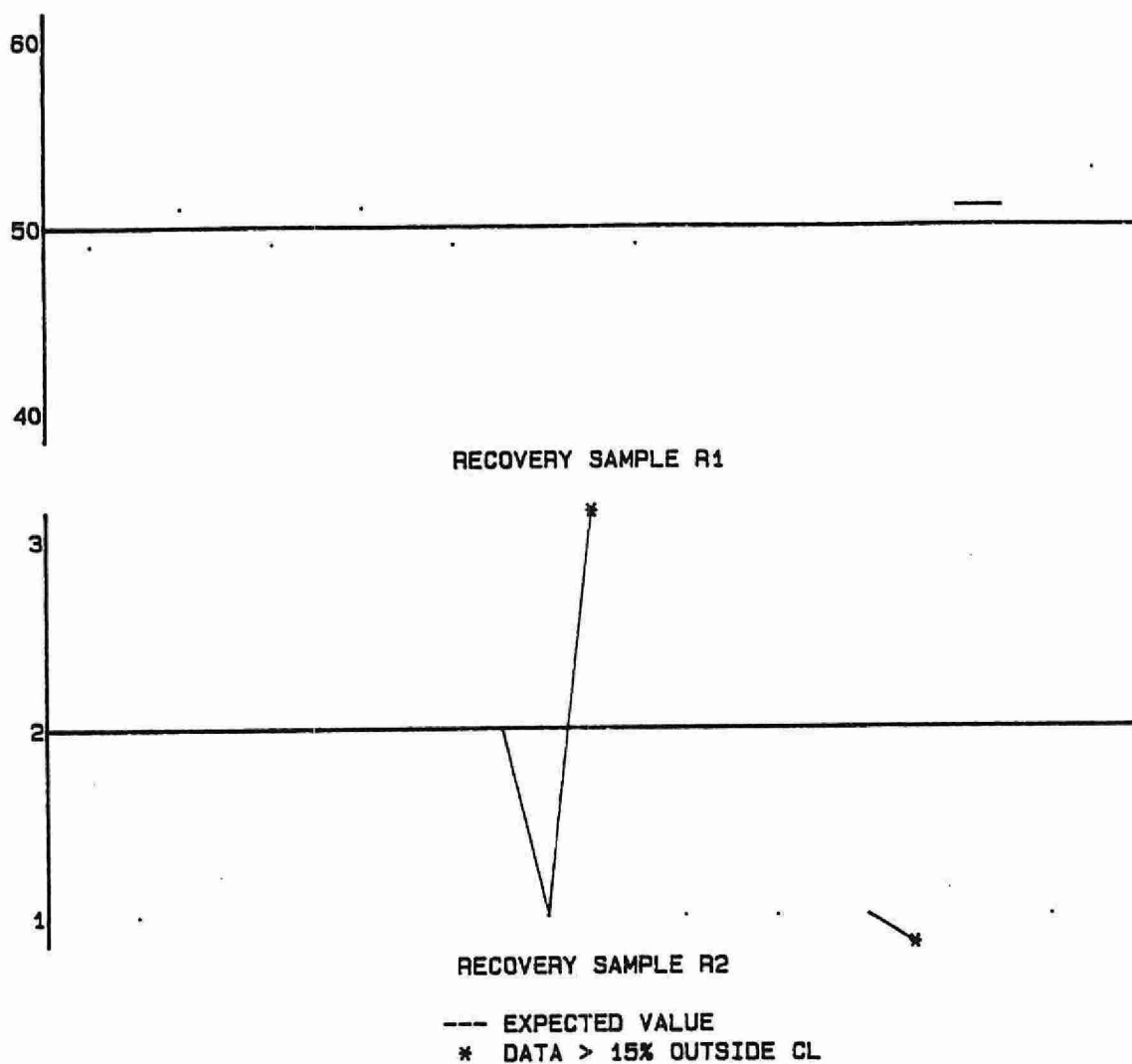
Analytical Range: 4 to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
	-----	-----	-----	-----
r1 :	11	50	50	1.3
r2 :	14	2	2	1.2

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	22	0 - 20	0.8	13.2
	3	20 - 50	1.6	4.4
	0	50 - 100	N/A	N/A
	25	Overall	0.9	N/A

QUALITY CONTROL GRAPHS CLAY (% BY WT.)

FROM: 16/10/87
TO: 21/12/87



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

***** COLOUR - APPARENT *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 15/10/80
LIS Test Name Code	: COLTR	Units	: FTU
Work Station Code	: DOCC	Unit Code	: 341000
Method Code	: 1102KP	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes		

SAMPLING:

Quantity Required : 75 mL
Container : PET 500 ml-Jar

ANALYTICAL PROCEDURE:

True colour is measured on a settle sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a broadband blue filter. Turbidity effects are partially suppressed by using a broadband red filter. True colour is calculated from the two absorbance measurements using an empirically derived equation. Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

Two colourimeters, one with broadband blue filter (400-450 nm) and the other with broadband red filter (660-740 nm). Colourimetric measurement is through a 4.0 cm. light path.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5

CALIBRATION:

Blank Only

CONTROLS:

Calibration : LTB plus 2 standards, e.g. QCA,QCB

NOTES:

Slope factor is changed whenever light source in a colourimeter or cell is replaced. This is accomplished by analyzing 7 standards.

COLOUR-APPARENT
QUALITY CONTROL DATA FROM 05/01/87 TO 23/12/87

Lab: Dorset

Analytical Range: 3 to 100 HZV

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	87	50	49	-1	1.2
b :	87	10	10	0	0.8
a+b :	87	60	59	-1	1.6
a-b :	87	40	40	0	1.2

s.d.(AB): Sw(within run): 0.8 S(between runs): 1.0 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

53 to 67 for A+B
 35 to 45 for A-B

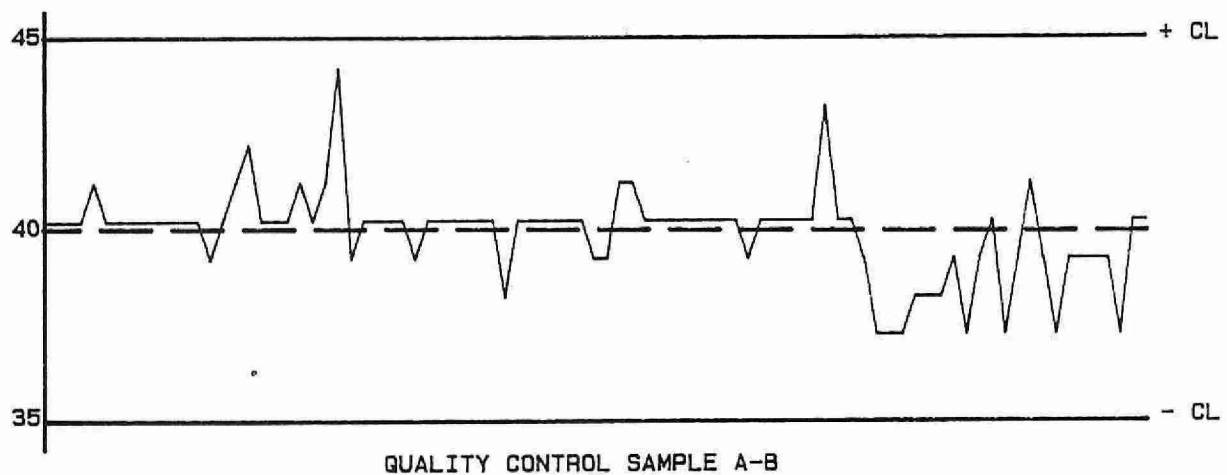
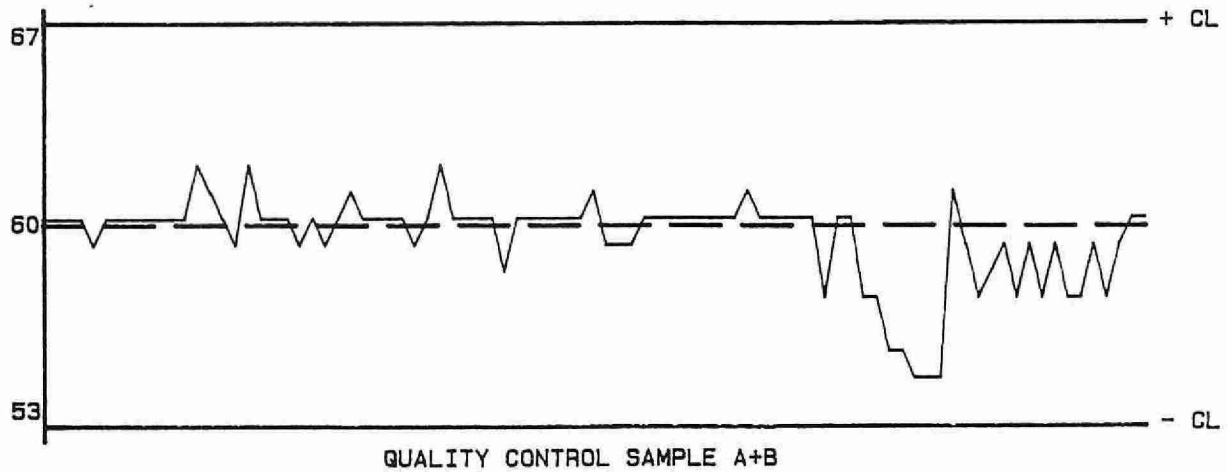
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	34	0 - 10	0.6	7.8
	57	10 - 25	0.9	5.0
	55	25 - 50	1.2	3.3
	59	50 - 100	1.4	2.0
	205	Overall	1.1	N/A

OTHER CHECKS:

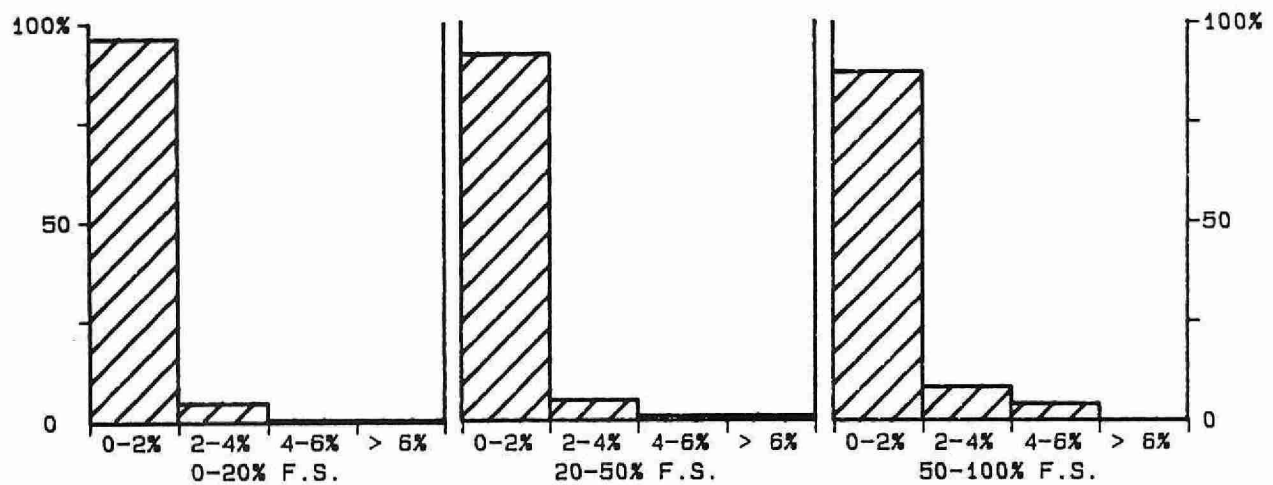
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	87	0	0.0

QUALITY CONTROL GRAPHS COLOUR-APPARENT (HZV)

FROM: 05/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 HZV

***** COLOUR - TRUE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 13/03/84
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 342000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Effluents, Surface Waters, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.
Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system. Color measurement is through a 3.0 cm. light path using a broadband filter (400-450 nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740 nm).

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

NOTES:

New procedure was initiated to conform with change in "Ontario Drinking Water Objectives"; copy of research study is available on request.
July, 1987: Automated data capture and processing by the WQS DCI system introduced.

COLOUR-TRUE
QUALITY CONTROL DATA FROM 07/01/87 TO 10/07/87

Lab: Colourimetry

Analytical Range: 2.8 to 100.0 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	39	50.0	52.4	2.4	0.84
b :	39	25.0	26.5	1.5	0.51
a+b :	39	75.0	78.9	3.9	1.15
a-b :	39	25.0	25.9	0.9	0.79
c :	39	25.0	26.5	1.5	0.51
d :	39	5.0	5.1	0.1	0.56
c+d :	39	30.0	31.6	1.6	0.89
c-d :	39	20.0	21.4	1.4	0.60

s.d.(AB): Sw(within run): 0.56 S(between runs): 0.63 S/Sw: 1.24
s.d.(CD): Sw(within run): 0.42 S(between runs): 0.54 S/Sw: 1.26

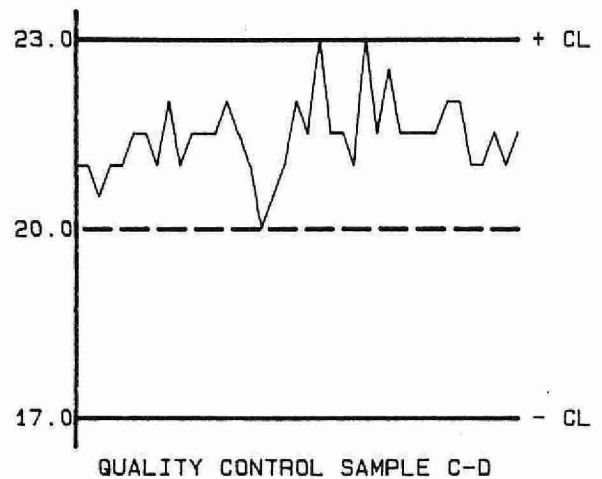
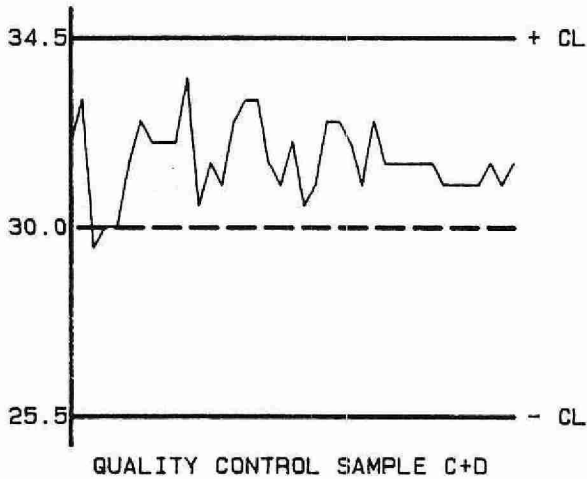
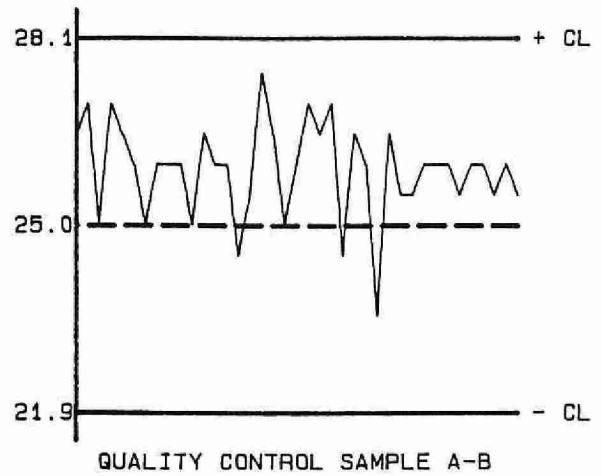
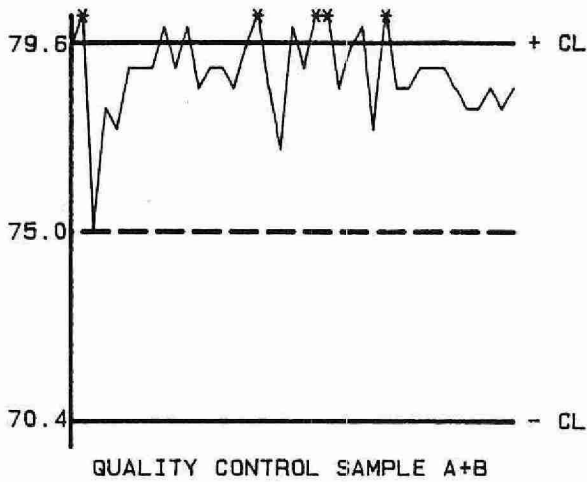
On any given day the calibration is accepted if the values obtained lie within the ranges:

70.4 to 79.6 for A+B
21.9 to 28.1 for A-B
25.5 to 34.5 for C+D
17.0 to 23.0 for C-D

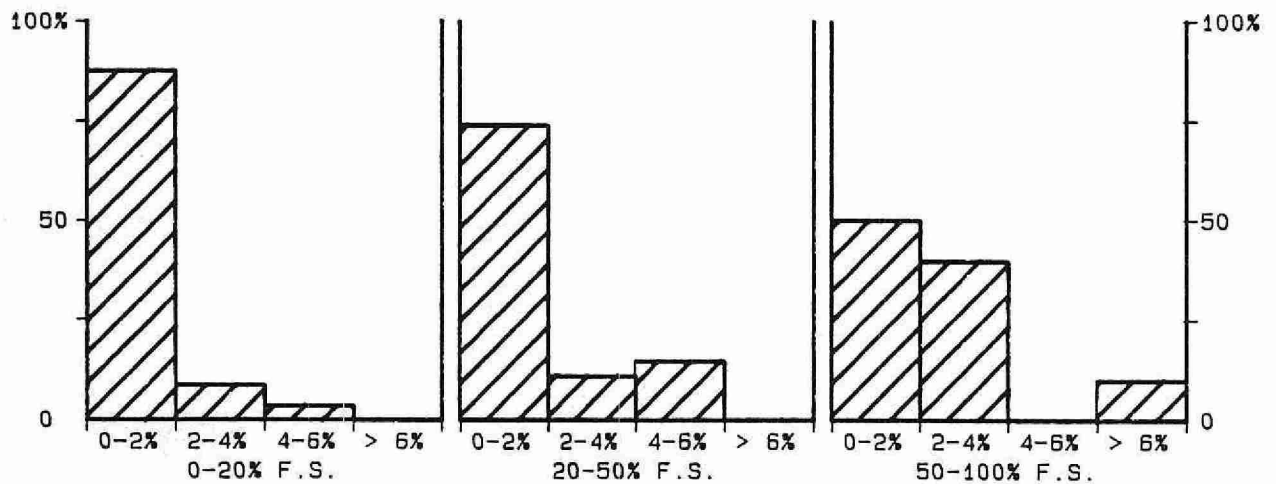
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	14	0.0 - 5.0	0.55	21.1
	12	5.0 - 10.0	0.65	8.4
	37	10.0 - 25.0	1.27	8.0
	21	25.0 - 50.0	1.76	4.9
	10	50.0 - 100.0	2.31	3.3
	94	Overall	1.41	N/A

QUALITY CONTROL GRAPHS COLOUR-TRUE (TCU)

FROM: 07/01/87
TO: 10/07/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 TCU

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: DOCC	Unit Code	: 350351
Method Code	: 0903CM	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation, Soil Extracts		

SAMPLING:

Quantity Required : 75 mL
Container : PET-500 ml Jars

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell and equilibrated to 25°C. The conductivity is read directly from a digital display.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

None.

CONTROLS:

Calibration : LTB plus 4 standards, e.g. QCA, QCB, 147 us plus 717.7 us stds.

NOTES:

*T value is based on duplicate analyses at concentrations above the lowest range.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 05/01/87 TO 23/12/87

Lab: Dorset

Analytical Range: 0.2 to 300 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	101	290	293	3	2.1
b :	101	74	75	1	0.9
a+b :	101	364	368	4	2.5
a-b :	101	216	219	3	2.0

s.d.(AB): Sw(within run): 1.4 S(between runs): 1.6 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

355 to 373 for A+B
 210 to 222 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	8	0.0 - 10.0	0.05	1.6
	12	10.0 - 20.0	0.13	0.7
	190	20.0 - 50.0	0.21	0.6
	45	50 - 100	0.3	0.4
	19	100 - 300	0.6	0.4
	274	Overall	0.3	N/A

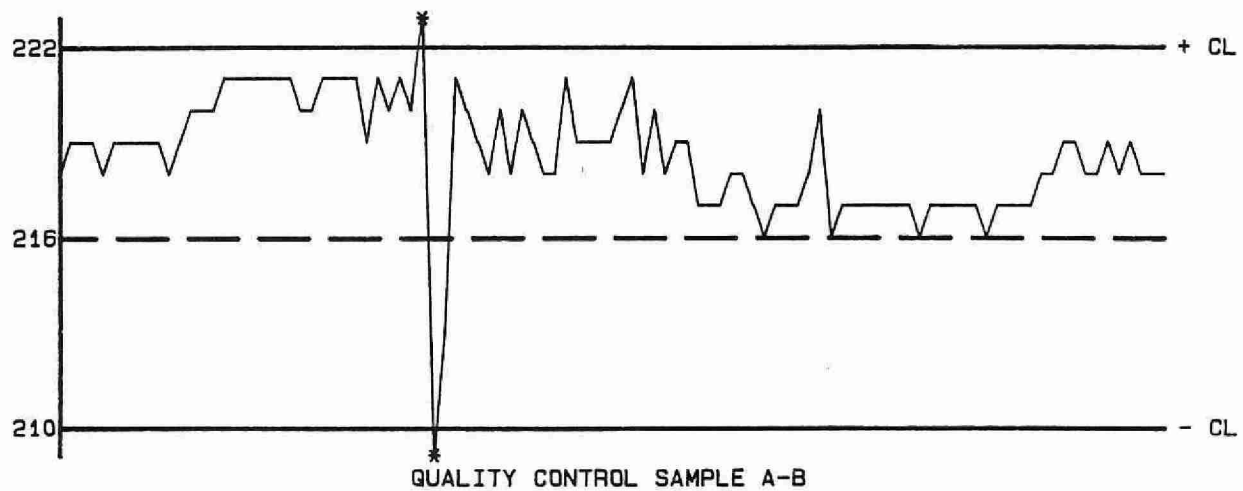
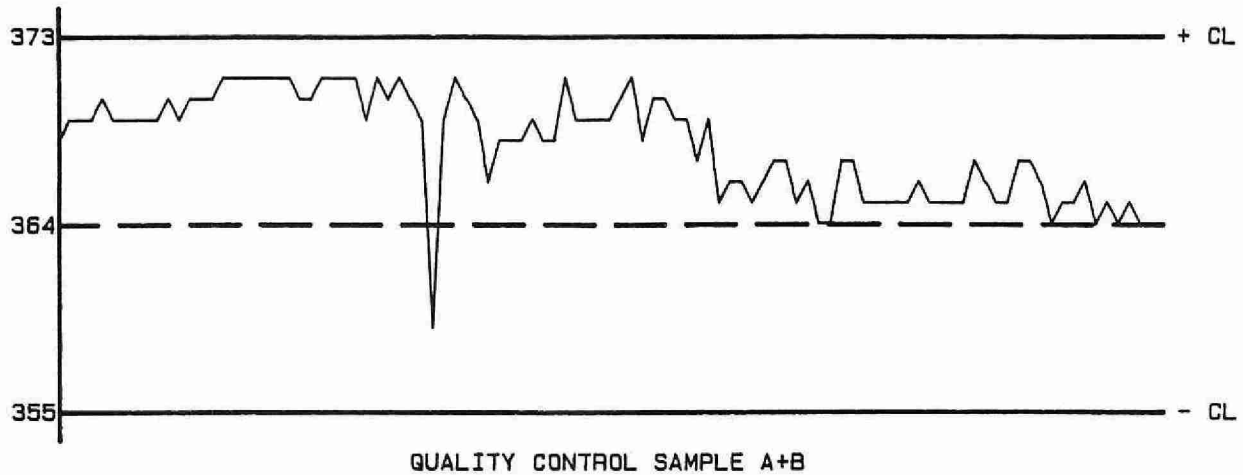
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	101	1	0.5

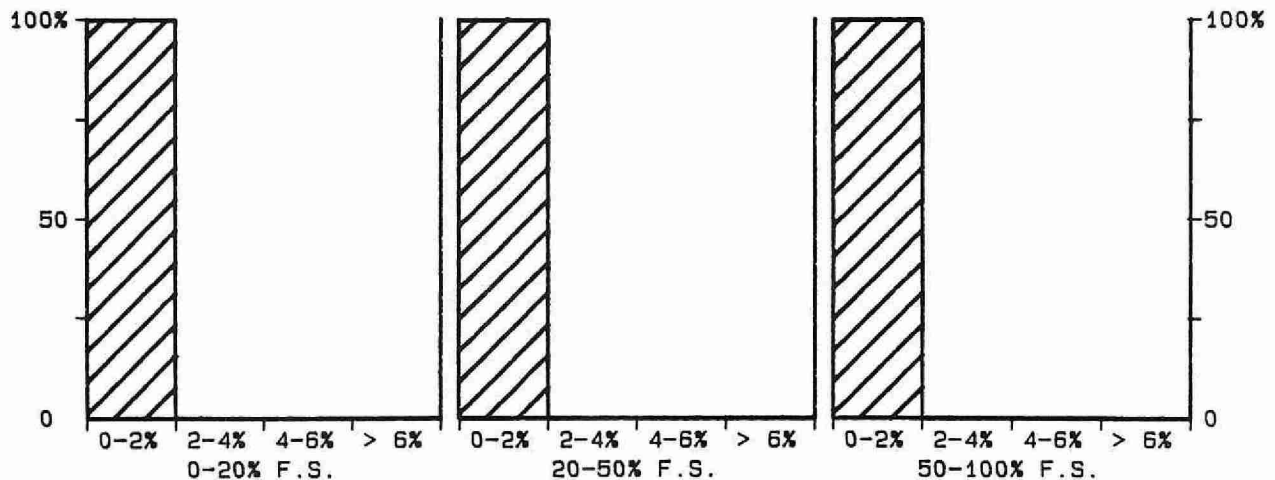
QUALITY CONTROL GRAPHS

CONDUCTIVITY (US/CM)

FROM: 05/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: PRIC1	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Pet-500 mL Jars

ANALYTICAL PROCEDURE:

After equilibration at 25°C, The conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

Compatibility between conductivity meter and chart recorder is confirmed by checking 3 standard resistances.

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 solution every 10 samples

MODIFICATIONS:

18/10/83 -Automated continuous flow system was introduced.

NOTES:

A calibration standard for the ion chromatographic system is utilized as a drift control for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 06/01/87 TO 22/12/87

Lab: Ion Chromatography

Analytical Range: 1.8 to 100.0 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	60	44.5	44.6	0.1	2.47
b :	60	7.5	9.2	1.7	1.22
a+b :	60	52.0	53.8	1.8	2.73
a-b :	60	37.0	35.4	-1.6	2.77

s.d.(AB): Sw(within run): 1.96 S(between runs): 1.95 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

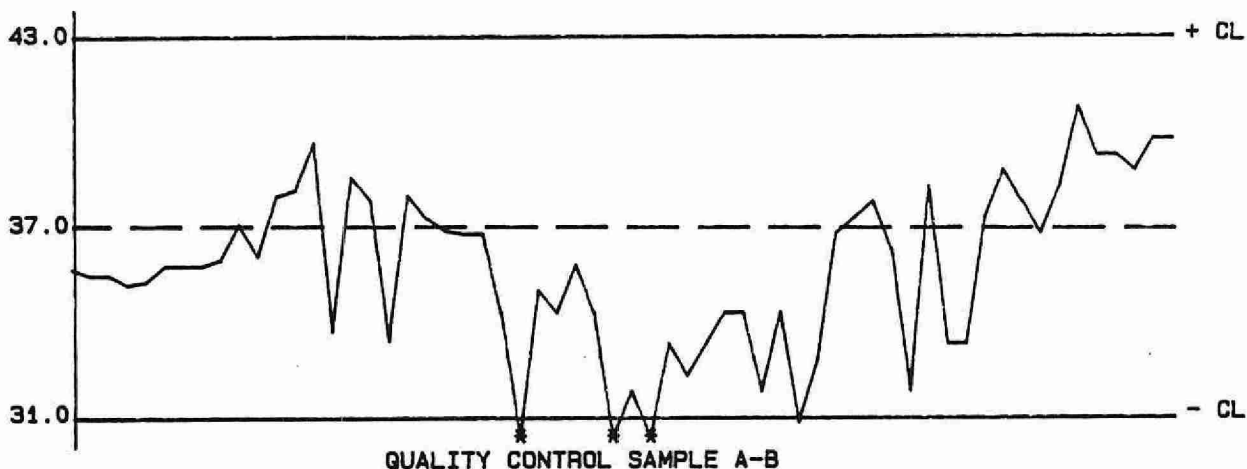
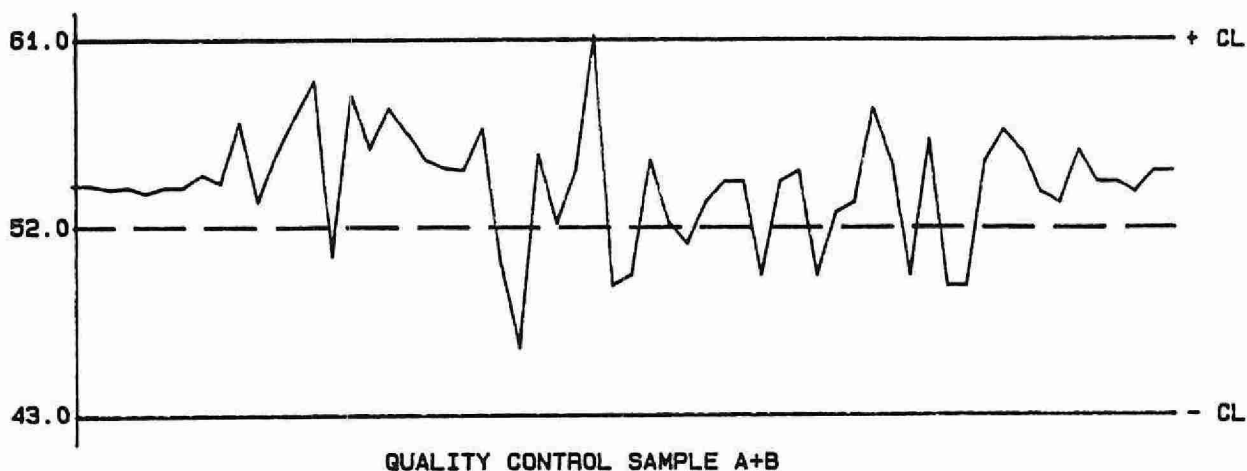
43.0 to 61.0 for A+B
 31.0 to 43.0 for A-B

DUPLICATES:

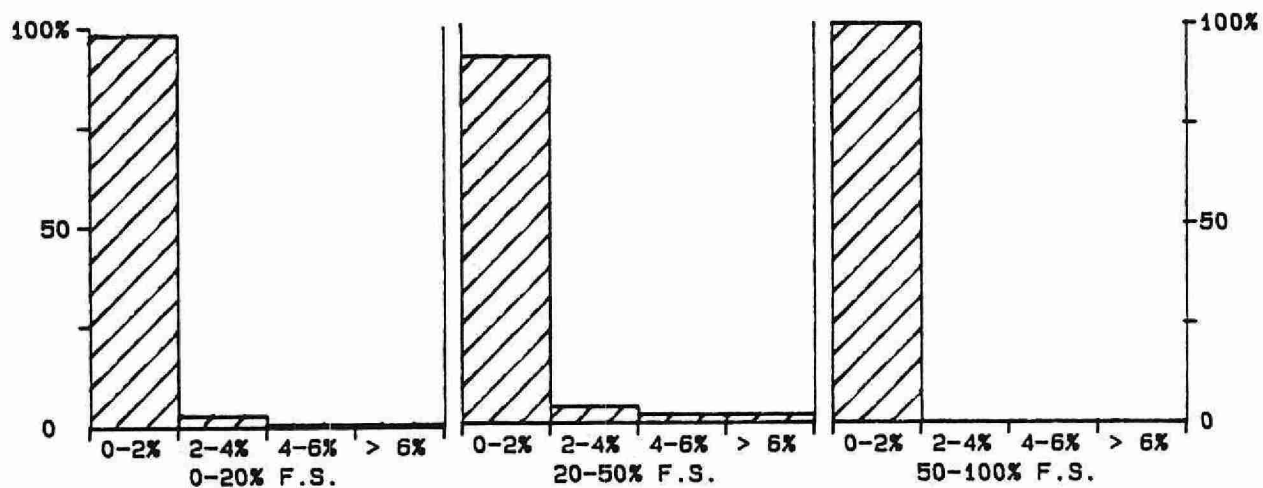
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0.0 - 10.0	0.37	6.4
25	10.0 - 20.0	0.72	4.9
49	20.0 - 50.0	1.22	3.9
5	50.0 - 100.0	0.38	0.6
98	Overall	0.96	N/A

QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 06/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: COND-SEW	Unit Code	: 350351
Method Code	: 002AI2	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Effluents		

SAMPLING:

Quantity Required : 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured; samples are filtered first if necessary.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5 T value: 25

CALIBRATION:

None

CONTROLS:

Calibration : BL plus 3 standards, e.g. QCA

MODIFICATIONS:

20/05/87-This workstation was eliminated with conductivity being measured depending on sample matrix at WATS or WQDIRT workstation.

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002B12	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured. N.B. pH, Gran alkalinity and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

01/04/84 -Automated system introduced for conductivity range 20-1000 uS/cm.
09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 05/01/87 TO 31/12/87

Lab: Titration

Analytical Range: 5 to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	161	718	716	-2	1.6
b :	161	147	149	2	0.7
a+b :	161	865	865	0	1.9
a-b :	161	571	568	-3	1.5
c :	161	147.0	148.6	1.6	0.69
d :	161	37.1	38.7	1.6	0.46
c+d :	161	184.1	187.3	3.2	0.89
c-d :	161	109.9	110.0	0.1	0.76

s.d.(AB): Sw(within run): 1.1 S(between runs): 1.2 S/Sw: 1.16
s.d.(CD): Sw(within run): 0.54 S(between runs): 0.59 S/Sw: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

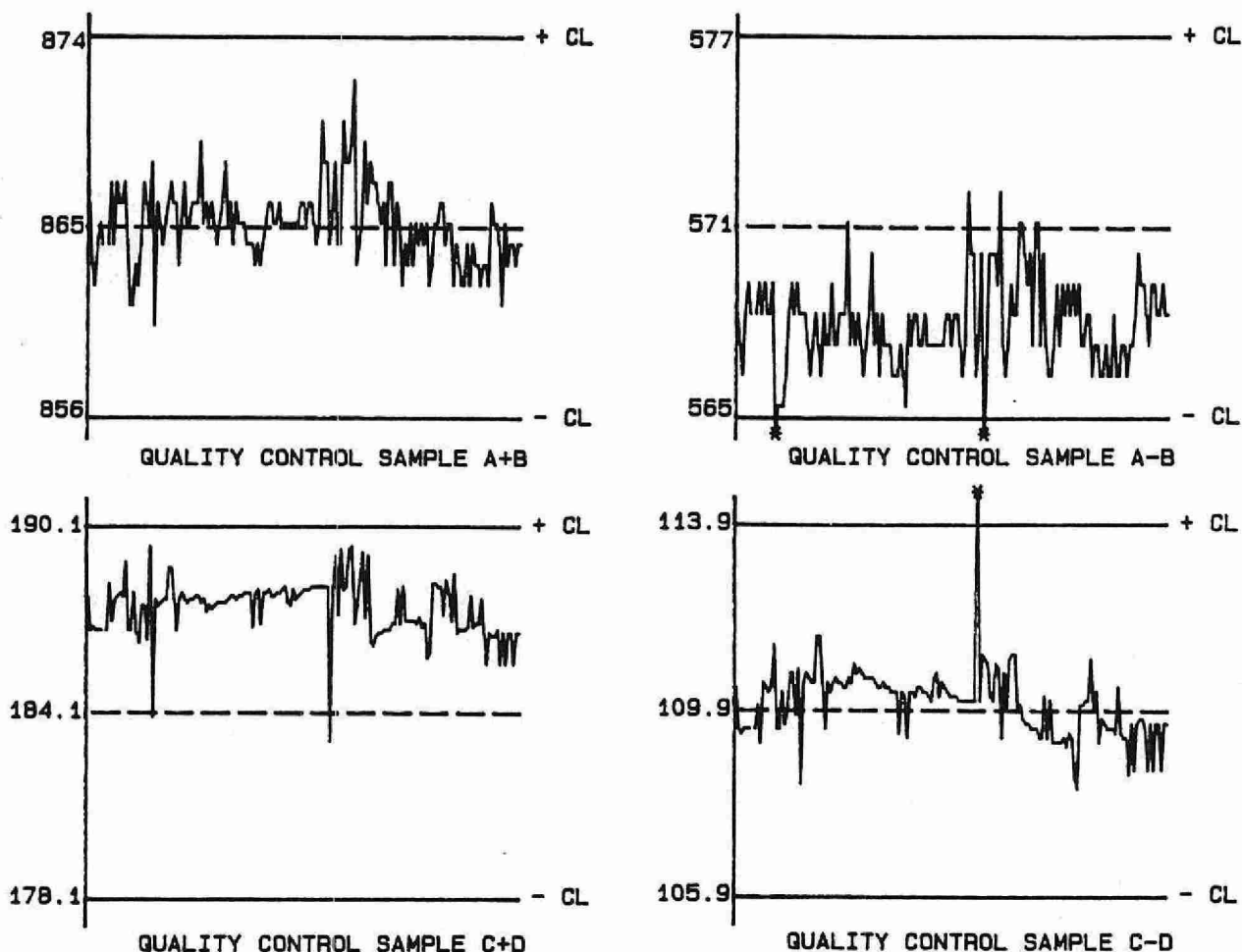
856 to 874 for A+B
565 to 577 for A-B
178.1 to 190.1 for C+D
105.9 to 113.9 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	60	0 - 50	1.0	2.7
	77	50 - 200	1.1	1.0
	152	200 - 500	1.4	0.4
	111	500 - 1000	1.8	0.3
	21	1000 - 2000	7.3	0.6
	421	Overall	2.1	N/A

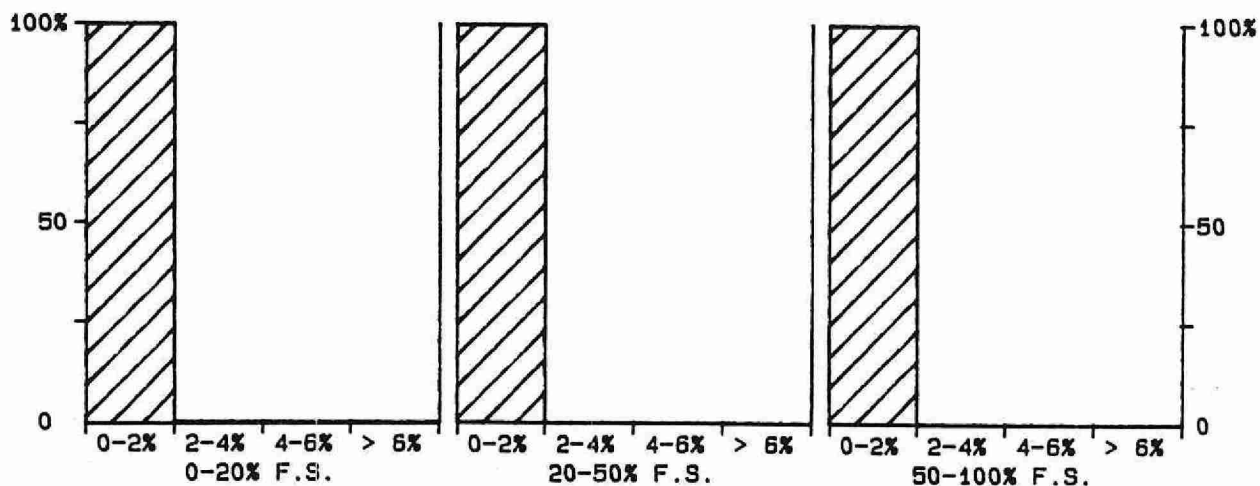
OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
:	162	3.2	0.0

QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 05/01/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2000 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured. N.B. pH, Gran alkalinity and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : In run standards throughout the run (diluted tap water 50% V/V)

MODIFICATIONS:

14/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity, and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 06/01/87 TO 30/12/87

Lab: Titration

Analytical Range: 3.7 to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	116	1413	1413	0	7.3
b :	116	718	719	1	3.6
a+b :	116	2131	2131	0	10.0
a-b :	116	695	694	-1	5.7
c :	116	718.0	718.6	0.6	3.63
d :	116	147.0	149.2	2.2	0.89
c+d :	116	865.0	867.8	2.8	4.17
c-d :	116	571.0	569.4	-1.6	3.24

s.d.(AB): Sw(within run): 4.0 S(between runs): 5.8 S/Sw: 1.43
s.d.(CD): Sw(within run): 2.29 S(between runs): 2.64 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

2108 to 2154 for A+B
680 to 710 for A-B
854.2 to 875.8 for C+D
563.8 to 578.2 for C-D

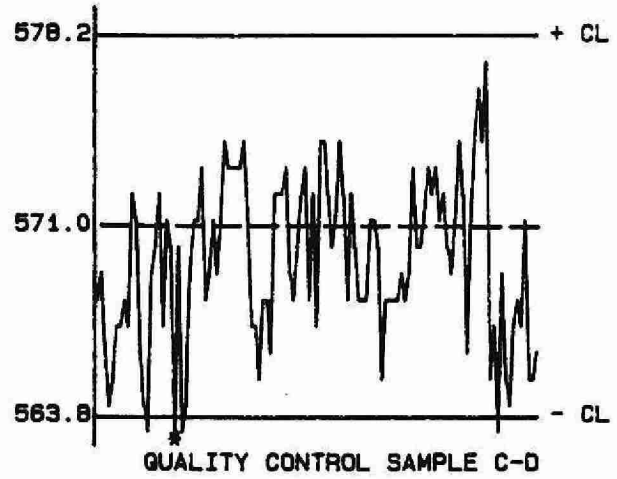
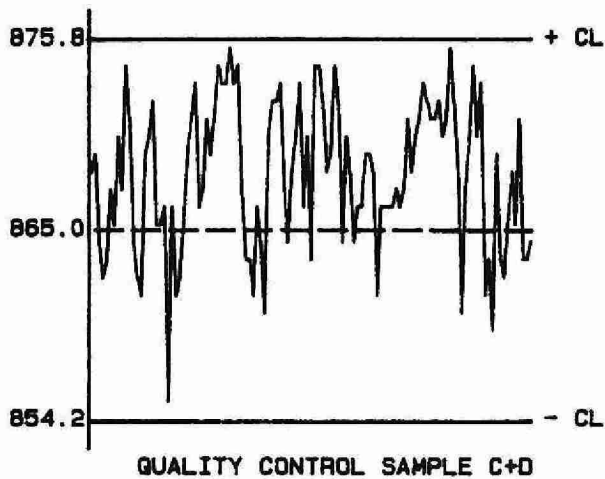
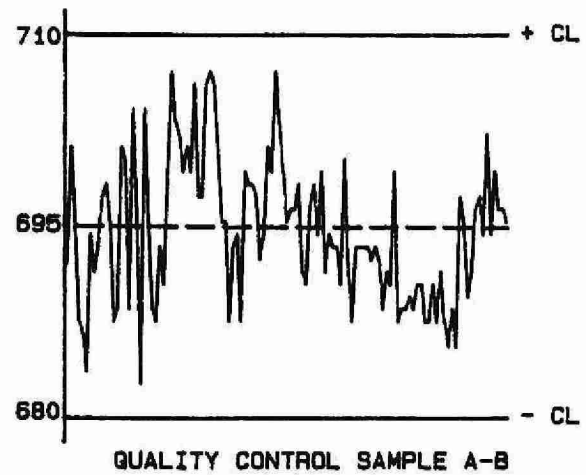
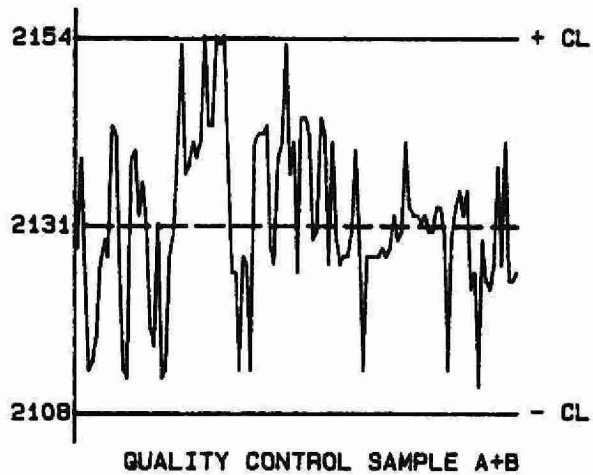
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	6	0.0 - 50.0	0.74	2.6
	61	50 - 200	1.7	1.4
	142	200 - 500	2.7	0.8
	81	500 - 1000	4.7	0.7
	13	1000 - 2000	14.0	1.0
	303	Overall	4.3	N/A

OTHER CHECKS:

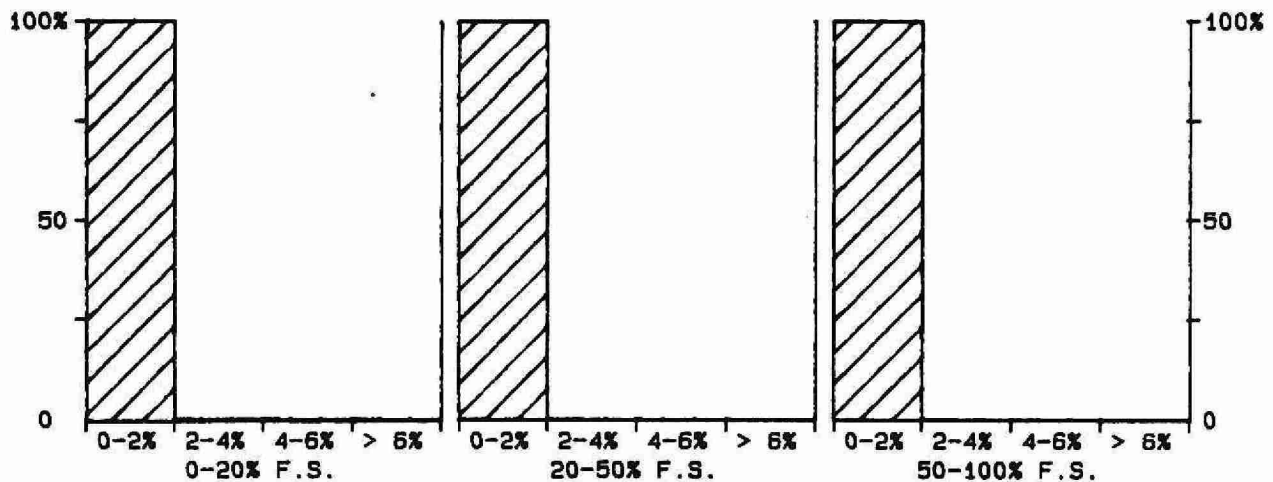
	Number of Data	Data Mean	Standard(1) Deviation
:	101	3.	0.1

QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 06/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2000 US/CM

***** CONDUCTIVITY *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 20/05/87
LIS Test Name Code	: COND25	Units	: uS/cm at 25°C
Work Station Code	: WQSDIRT	Unit Code	: 350351
Method Code	: 004AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required : 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured; samples are filtered first if necessary. Analysis is performed on supernatant or filtrate.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5 T value: 25

CALIBRATION:

None

CONTROLS:

Calibration : BL plus 3 standards, e.g. QCA

MODIFICATIONS:

None

CONDUCTIVITY WQSDIRT
QUALITY CONTROL DATA FROM 21/05/87 TO 31/12/87

Lab: Titration

Analytical Range: 29.0 to 10000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	92	6668	6123	-545	137.1
b :	92	2767	2584	-183	56.8
a+b :	92	9435	8708	-727	172.1
a-b :	92	3901	3539	-362	120.1
c :	92	2767.0	2584.5	-182.5	56.83
d :	92	717.8	700.2	-17.6	16.24
c+d :	92	3484.8	3284.7	-200.1	65.19
c-d :	92	2049.2	1884.2	-165.0	52.31

s.d.(AB): Sw(within run): 84.9 S(between runs): 104.9 S/Sw: 1.24
s.d.(CD): Sw(within run): 36.99 S(between runs): 41.79 S/Sw: 1.13

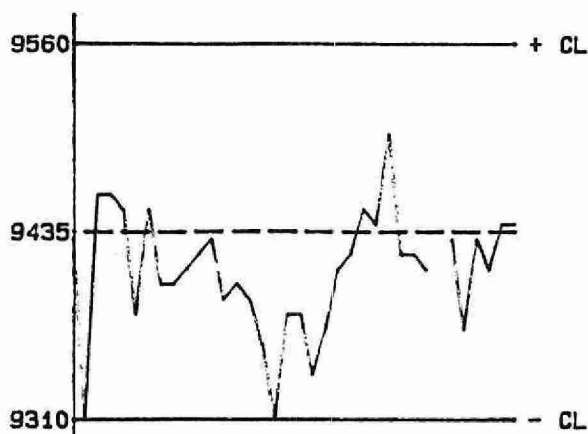
On any given day the calibration is accepted if the values obtained lie within the ranges:

9300 to 9570 for A+B
3811 to 3991 for A-B
3424.8 to 3544.8 for C+D
2009.2 to 2089.2 for C-D

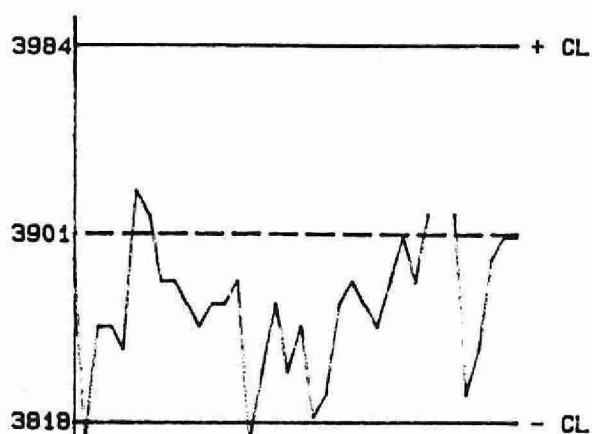
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	132	0.0 - 1000.0	5.81	1.3
	32	1000 - 2000	17.4	1.3
	13	2000 - 4000	77.3	2.9
	4	4000 - 7500	15.0	0.3
	1	7500 - 10000	N/A	N/A
	182	Overall	22.6	N/A

QUALITY CONTROL GRAPHS CONDUCTIVITY WQSDIRT (US/CM)

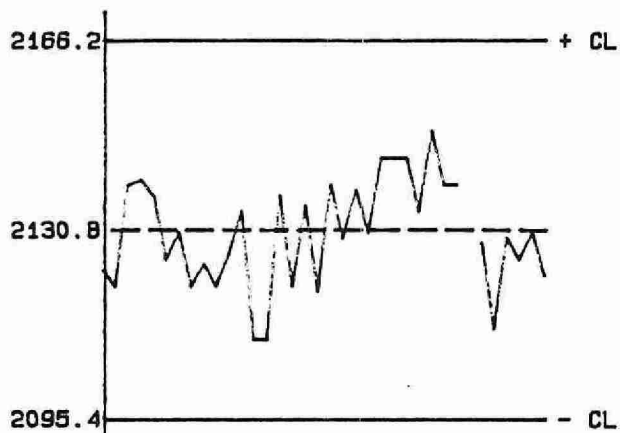
FROM: 22/03/88
TO: 25/07/88



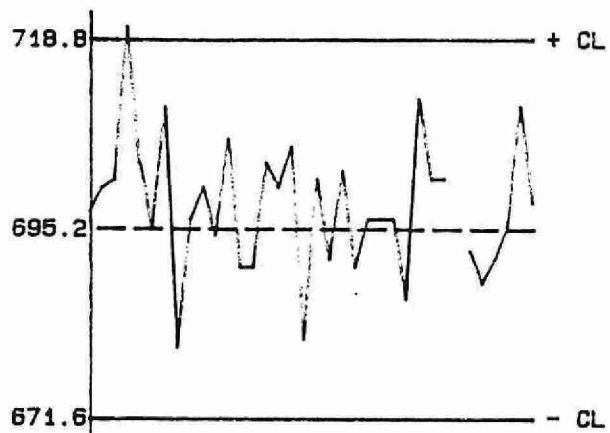
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

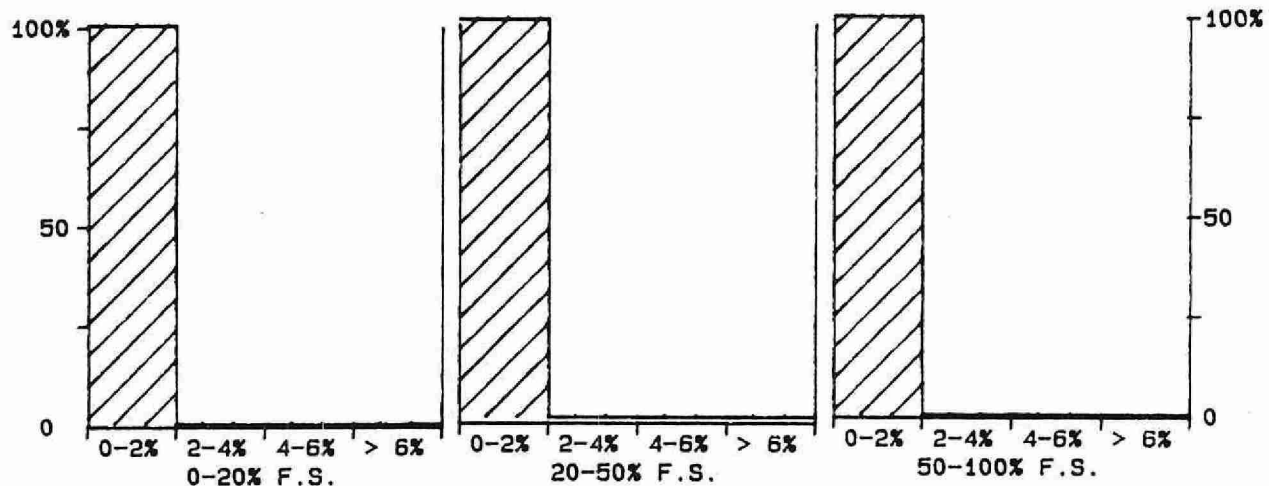


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10000 US/CM

***** TOTAL COPPER - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: CUUT	Units	: ug/g as Cu
Work Station Code	: DOHMTE	Unit Code	: 073829
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Cu by AAS at 324.8 N.M. using an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale value.

Lead, nickel and zinc are also determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples

Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C

06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.

Values for recoveries are unknown - average value used.

TOTAL COPPER - SOIL
QUALITY CONTROL DATA FROM 09/02/87 TO 01/12/87

Lab: Dorset Soils

Analytical Range: 2.8 to 50.0 ug/g as Cu

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	37.0	36.9	-0.1	0.68
b :	8	13.2	13.2	0.0	0.84
a+b :	8	50.2	50.1	-0.1	1.15
a-b :	8	23.8	23.7	-0.1	1.00

s.d.(AB): Sw(within run): 0.71 S(between runs): 0.76 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

45.7 to 54.7 for A+B
 20.8 to 26.8 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	24	13.7	13.8	0.81
r2 :	24	15.6	15.7	1.09
r3 :	23	14.4	13.9	1.53

DUPLICATES:

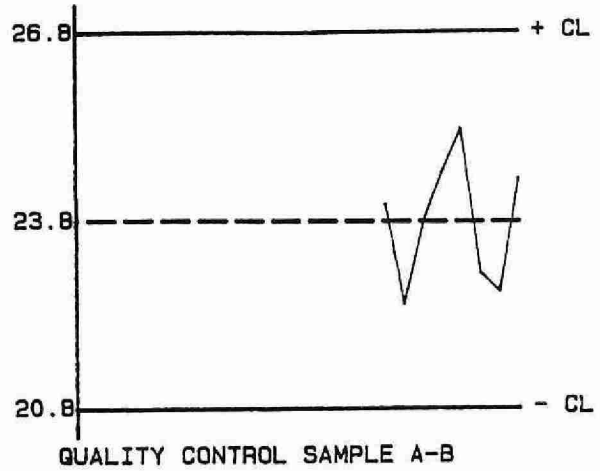
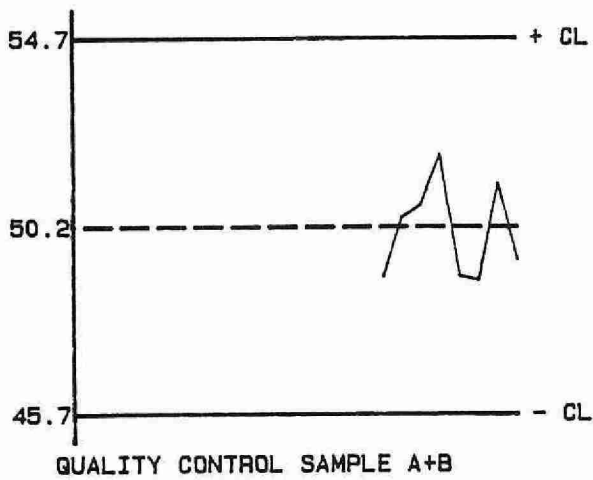
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
40	0.0 - 10.0	0.56	8.5
28	10.0 - 25.5	0.96	6.1
2	25.5 - 50.0	2.68	7.7
70	Overall	0.87	N/A

OTHER CHECKS:

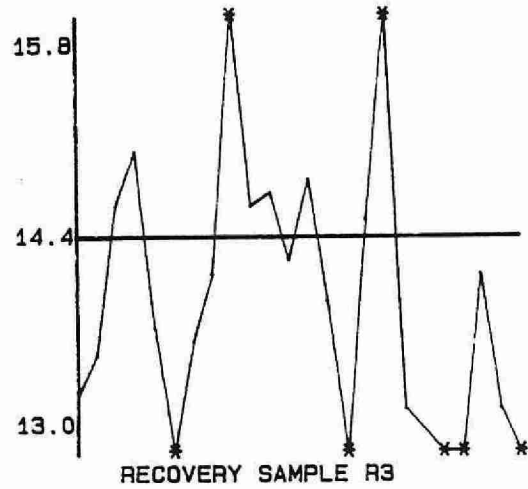
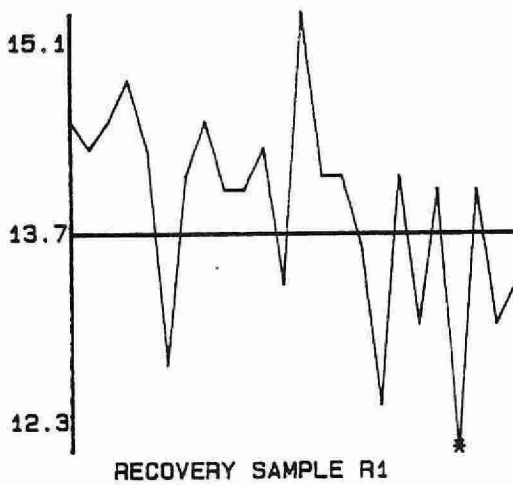
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	24	0.1	0.30

QUALITY CONTROL GRAPHS TOTAL COPPER - SOIL (UG/G AS CU)

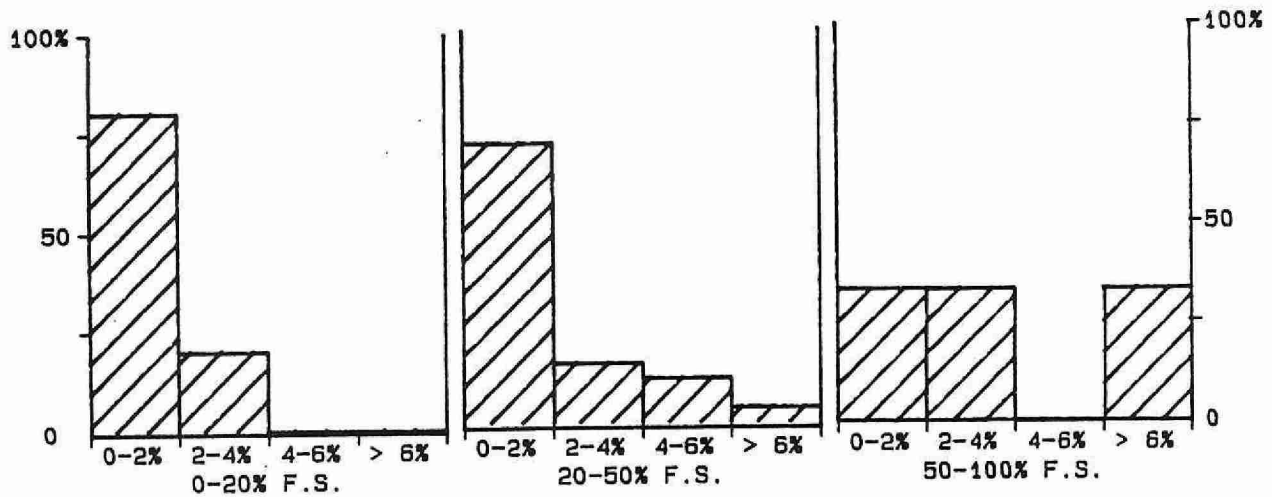
FROM: 09/02/87
TO: 01/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



COPPER

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	
LIS Test Name Coad:	CUUT	Units	: ug/l as CU
Work Station Code	: DOASV	Unit Code	: 063829
Method Coade	: 001PP2	Supervisor	: F.Tomassini
Sample Type/Matrix:	Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required: 100 mL
Container : 500 mL, acid washed Nalgene Teflon container, bagged
in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when copper is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

Metrohm 646 VA Processor with Model 675 VA Sample Changer

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.3 T value: 1.5

CALIBRATION:

BL plus 2 standareds daily

CONTROL:

Calibration : BL plus 2 standards, e.g. QCA and EPA standard
Drift : End of every run (approximately every 8 samples)

TOTAL COPPER
QUALITY CONTROL DATA FROM 17/02/87 TO 23/12/87

Lab: Dorset

Analytical Range: 0.54 to 4.00 ug/l as Cu

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	82	3.60	4.04	0.44	1.108
b :	82	0.90	1.44	0.54	0.805
a+b :	82	4.50	5.47	0.97	1.724
a-b :	82	2.70	2.60	-0.10	0.882

s.d.(AB): Sw(within run): 0.624 S(between runs): 0.968 S/Sw: 1.55

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54 to 8.46 for A+B
0.06 to 5.34 for A-B

DUPLICATES:

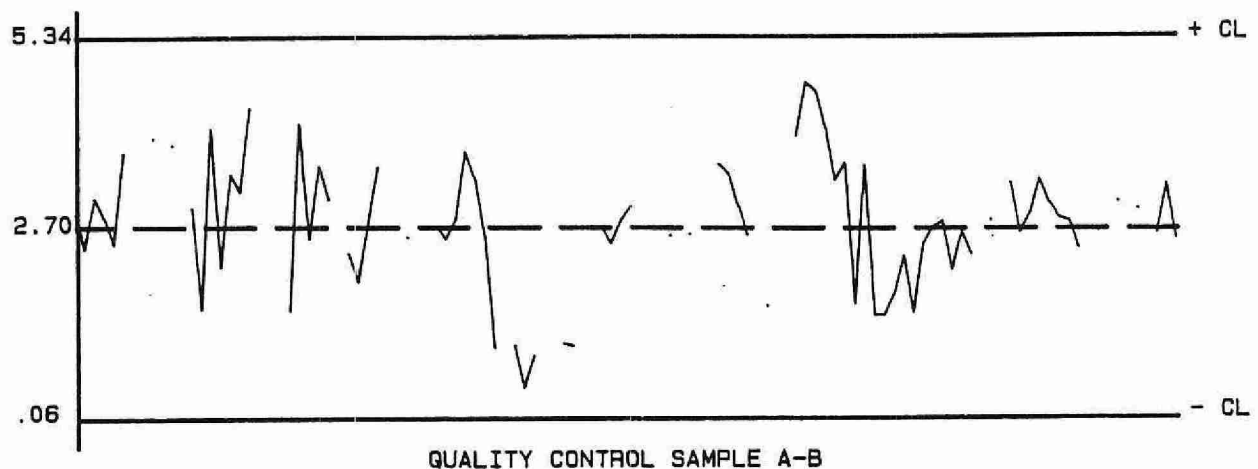
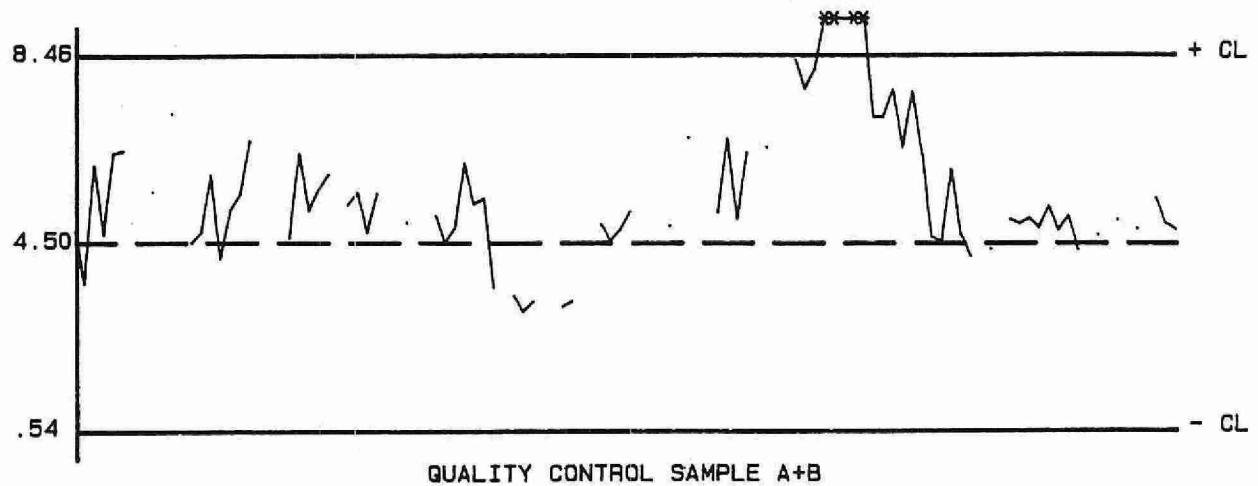
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 0.50	0.108	27.1
17	0.50 - 1.00	0.246	33.1
12	1.00 - 1.50	0.451	38.7
13	1.50 - 3.00	0.742	36.3
0	3.00 - 4.00	N/A	N/A
48	Overall	0.472	N/A

OTHER CHECKS:

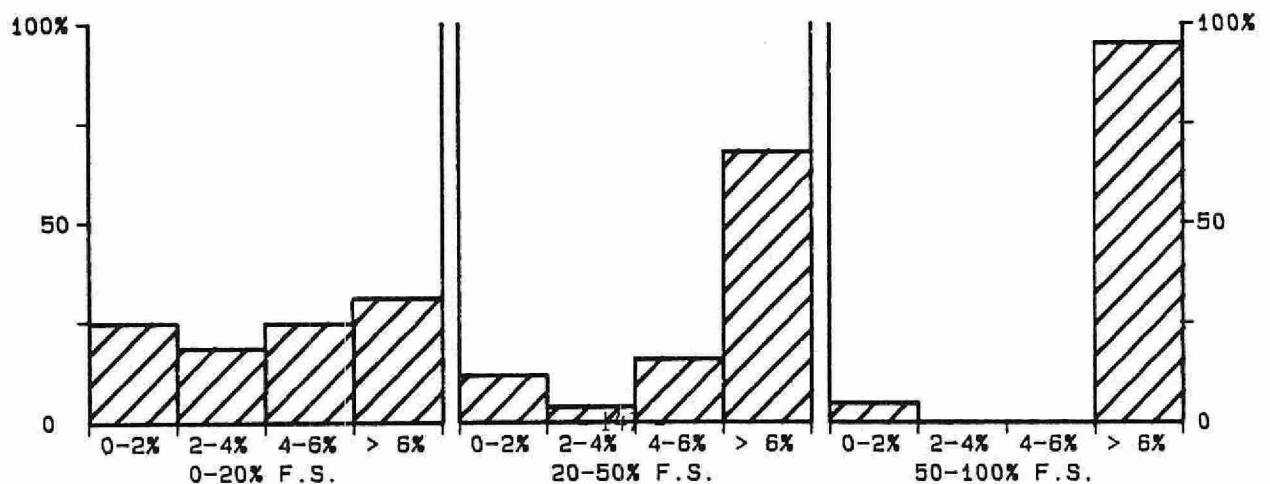
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	75	0.70	1.596

QUALITY CONTROL GRAPHS TOTAL COPPER (UG/L AS CU)

FROM: 17/02/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064809
Method Code	: 003AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160°C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex. Approximate absorbance: 0.8 at the full scale level.

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.01	T value: 0.05
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CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

1985 -WFF dropped and all samples now routed to WFNO3

FLUORIDE
QUALITY CONTROL DATA FROM 05/01/87 TO 17/12/87

Lab: Colourimetry

Analytical Range: 0.05 to 2.00 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	99	1.50	1.51	0.01	0.023
b :	99	0.30	0.31	0.01	0.012
a+b :	99	1.80	1.82	0.02	0.029
a-b :	99	1.20	1.21	0.01	0.023

s.d.(AB): Sw(within run): 0.016 S(between runs): 0.018 S/Sw: 1.13

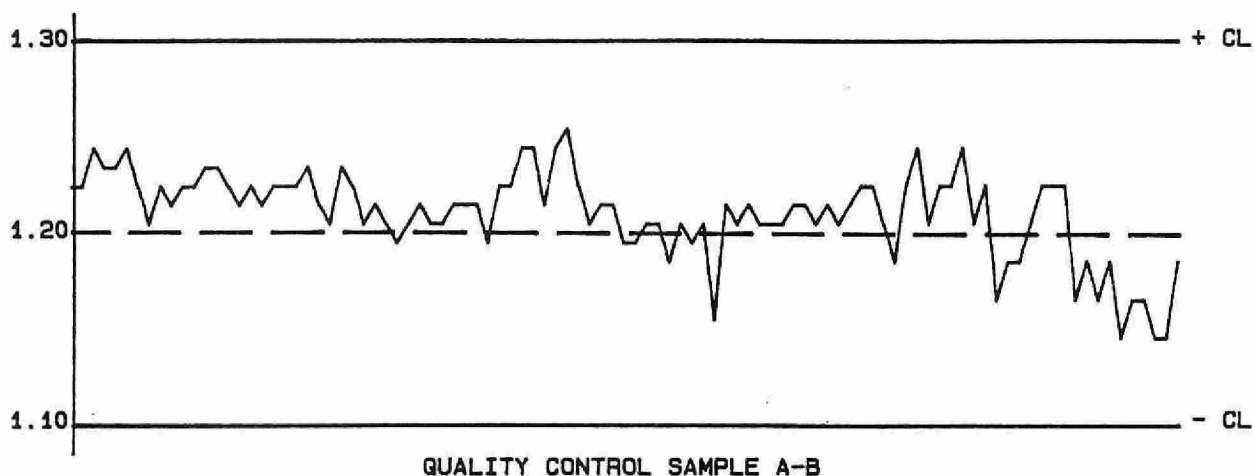
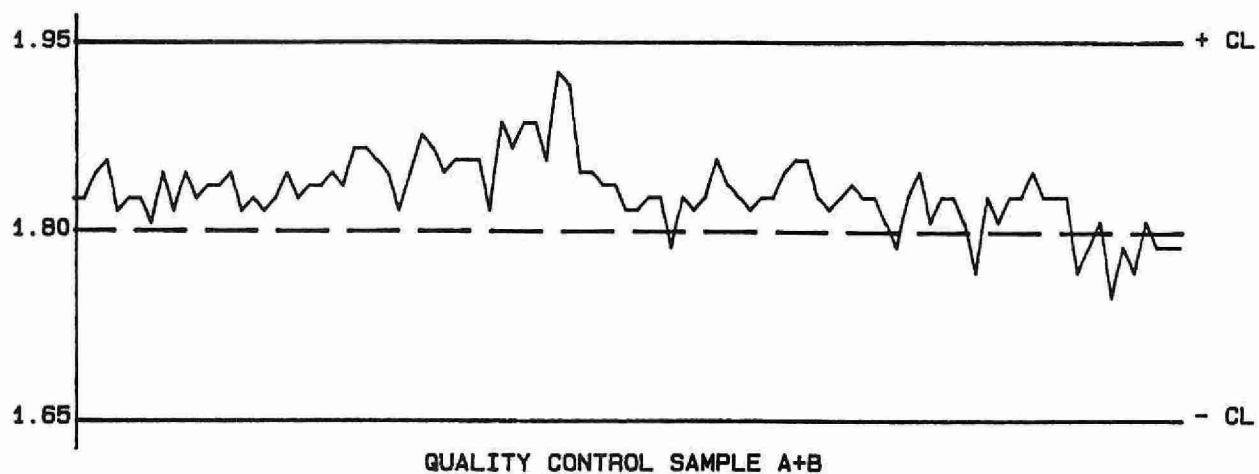
On any given day the calibration is accepted if the values obtained lie within the ranges:

1.65 to 1.95 for A+B
 1.10 to 1.30 for A-B

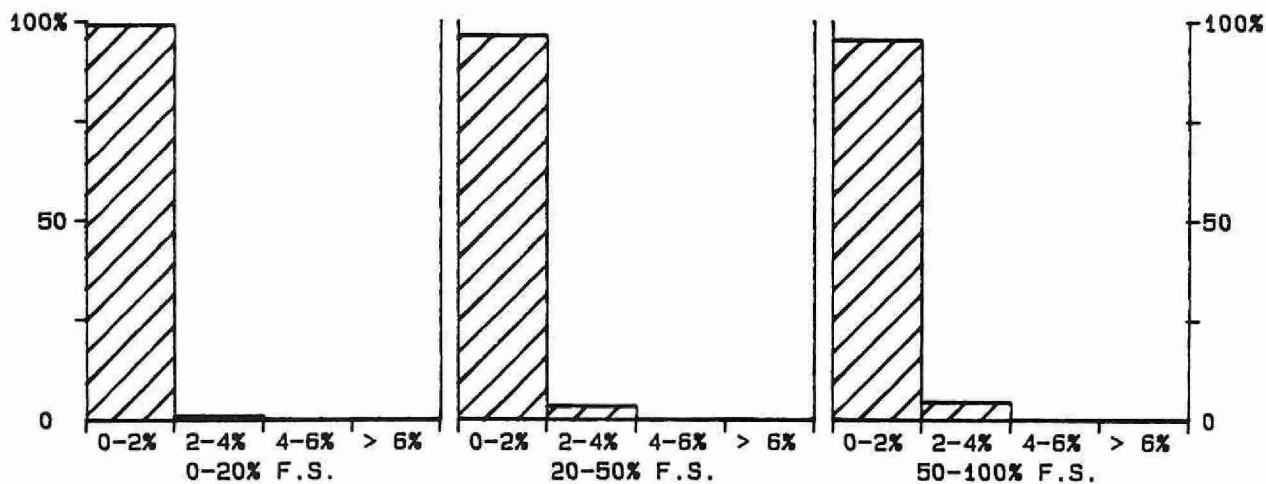
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	198	0.00 - 0.20	0.009	10.7
	28	0.20 - 0.50	0.009	3.1
	27	0.50 - 1.00	0.012	1.5
	22	1.00 - 2.00	0.015	1.3
	275	Overall	0.010	N/A

QUALITY CONTROL GRAPHS FLUORIDE (MG/L AS F)

FROM: 05/01/87
TO: 17/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS F

***** FLUORIDE *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FFIDUR	Units	: ug/L as F
Work Station Code	: DOSPF	Unit Code	: 073809
Method Code	: 001AIE	Supervisor	: A. Neary
Sample Type/Matrix	: Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required : 50 mL
Container : Plastic

SAMPLE PREPARATION:

None

ANALYTICAL PROCEDURE:

Fluoride is determined via an automated flow system for which the detector is a specific ion electrode; prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL plus 1 standard in duplicate
Interference : Combined fluoride and aluminum standard confirms that aluminum is not an interference.

MODIFICATIONS:

01/01/82 -The above procedure is not described in HAMES, but a copy of the development report is available on request. The manual procedure in HAMES for the determination of fluoride by specific ion electrode is similar.

NOTES:

At the present time this procedure is restricted to special projects. Values for recoveries are based upon the average recovery value obtained.

FLUORIDE
QUALITY CONTROL DATA FROM 05/01/87 TO 22/12/87

Lab: Dorset Soils

Analytical Range: 1.9 to 100.0 ug/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	87	48.0	48.3	0.3	0.91
b :	87	24.0	24.4	0.4	0.77
a+b :	87	72.0	72.7	0.7	1.52
a-b :	87	24.0	23.9	-0.1	0.75

s.d.(AB): Sw(within run): 0.53 S(between runs): 0.84 S/Sw: 1.59

On any given day the calibration is accepted if the values obtained lie within the ranges:

67.5 to 76.5 for A+B
 21.0 to 27.0 for A-B

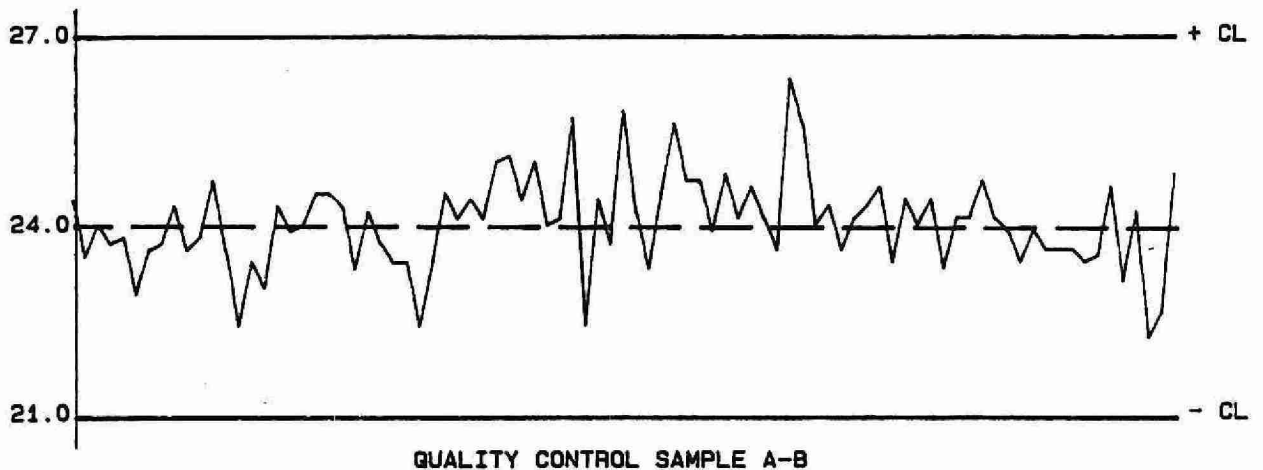
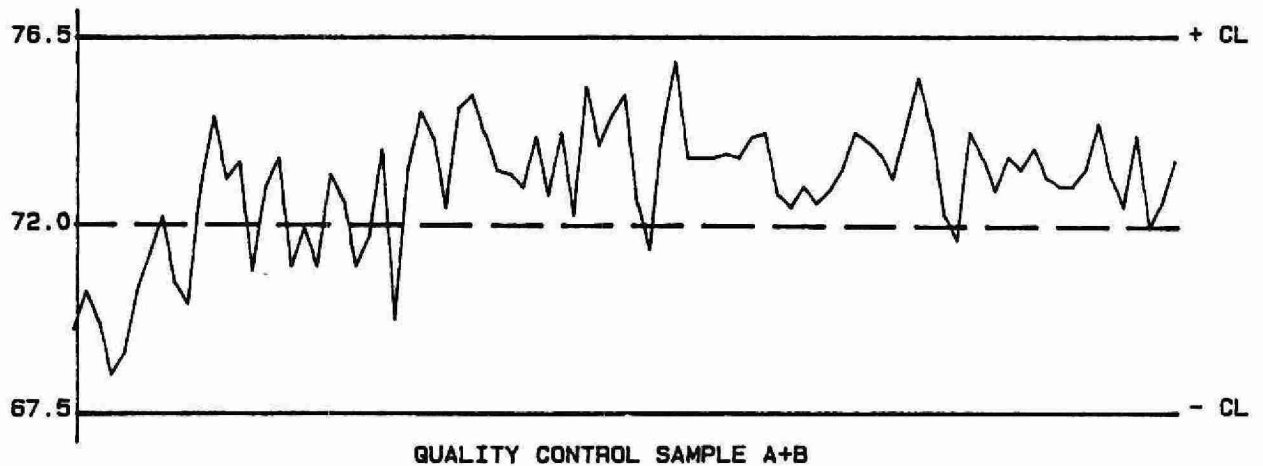
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	33	0.0 - 20.0	0.37	5.1
	180	20.0 - 50.0	0.82	2.1
	70	50.0 - 100.0	1.10	1.8
	283	Overall	0.86	N/A

OTHER CHECKS:

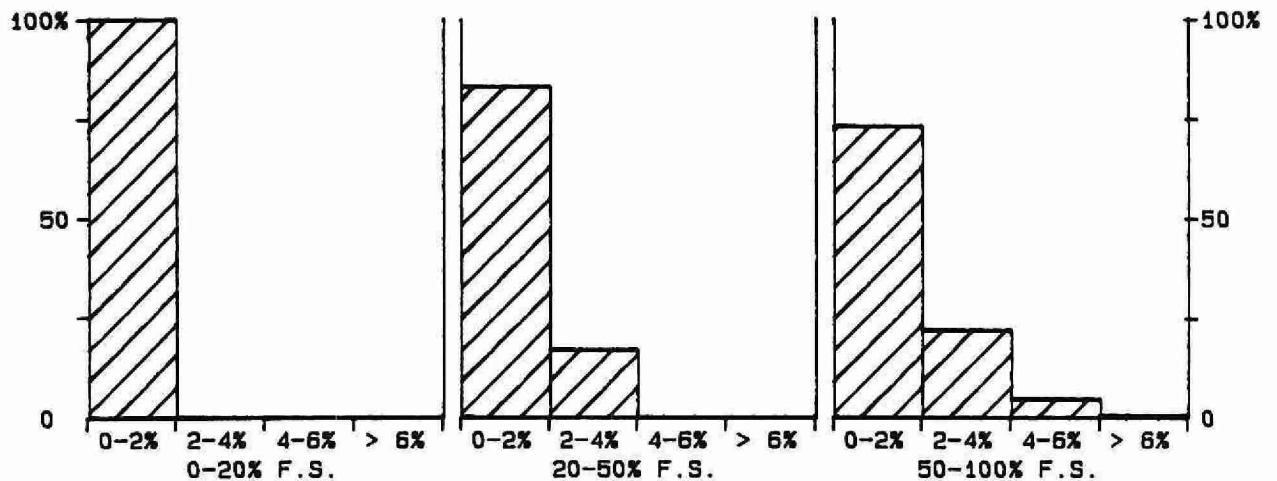
	Number of Data	Data Mean	Standard(1) Deviation
Al Interference :	87	59.5	0.90

QUALITY CONTROL GRAPHS FLUORIDE (UG/L AS F)

FROM: 05/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 70 UG/L AS F

***** IRON - SOIL (Xdi) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEDI	Units	: % by weight Fe
Work Station Code	: DOMETDI	Unit Code	: 070826
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.5 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried, disaggregated, ground and sieved to <150um.

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80°C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 248.3 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level

N.B. Aluminum is determined on the same extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown - average value used.

IRON - SOIL (Xdi)
QUALITY CONTROL DATA FROM 12/03/87 TO 02/11/87

Lab: Dorset Soils

Analytical Range: 0.04 to 2.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	12	1.50	1.51	0.01	0.033
b :	12	0.50	0.51	0.01	0.015
a+b :	12	2.00	2.02	0.02	0.036
a-b :	12	1.00	1.00	0.00	0.036

s.d.(AB): Sw(within run): 0.025 S(between runs): 0.026 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.85 to 2.15 for A+B
0.90 to 1.10 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	16	1.19	1.20	0.077
r2 :	15	1.06	1.15	0.063
r3 :	16	0.93	0.95	0.055

DUPLICATES:

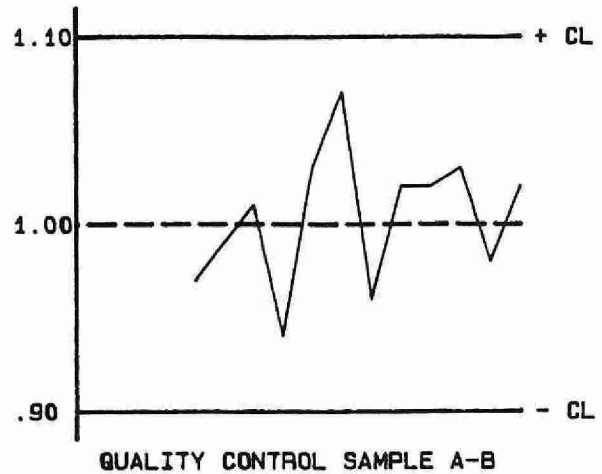
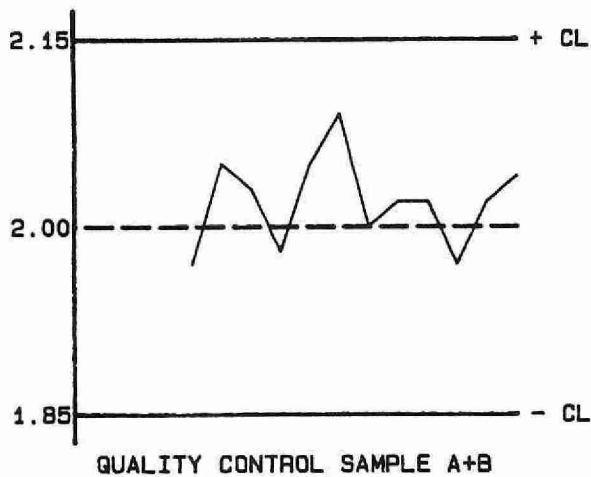
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 0.40	0.009	2.9
26	0.40 - 1.00	0.025	3.3
16	1.00 - 2.00	0.028	1.9
48	Overall	0.025	N/A

OTHER CHECKS:

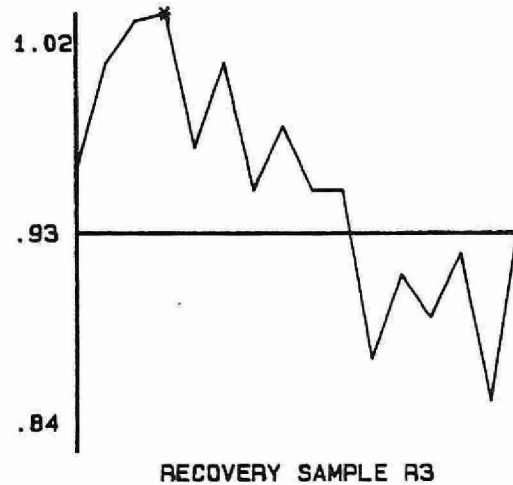
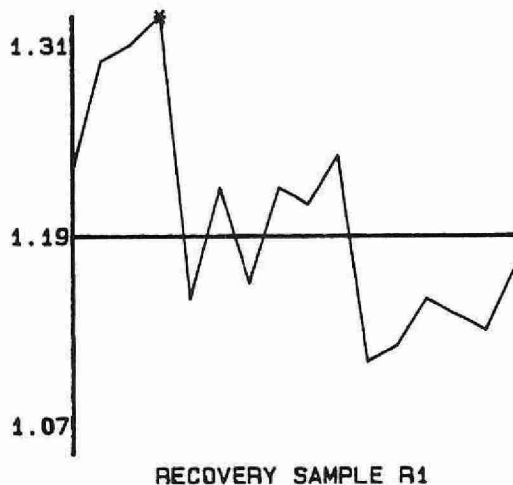
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	15	0.00	0.000

QUALITY CONTROL GRAPHS IRON - SOIL (XDI) (% AS FE)

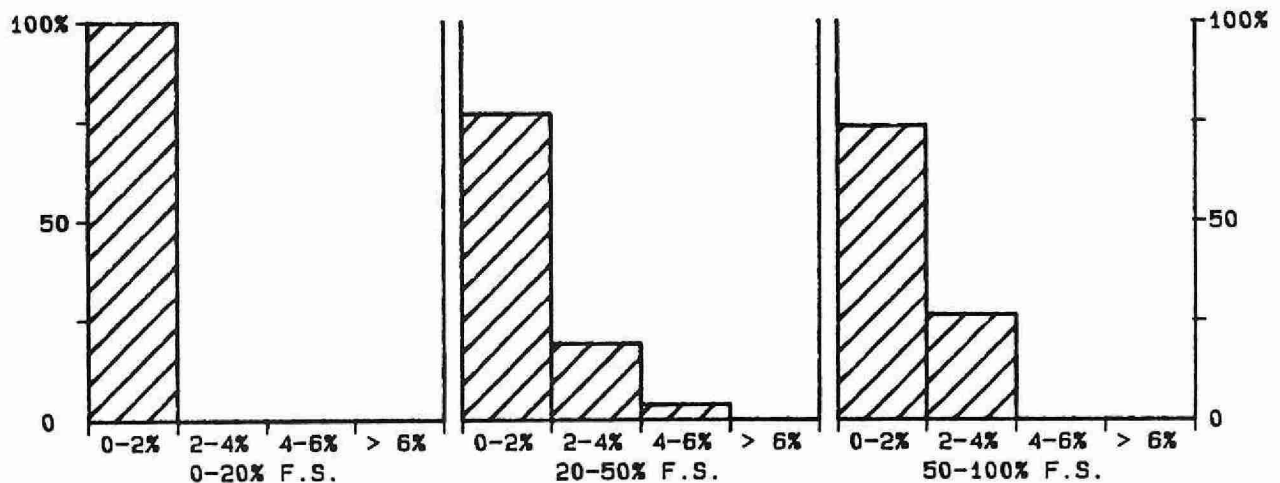
FROM: 12/03/87
TO: 02/11/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** IRON - SOIL (XPY) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: FEEPY	Units	: % by wgt asFe
Work Station Code	: DOMETALX	Unit Code	: 070826
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 0.6 g (dry<150 um)
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 μm .

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 10 minutes and the supernatant is analyzed by AAS at 248.3 nm using an air-acetylene flame. Approximate absorbance: 0.3 at the full scale value. Aluminum and manganese may be determined simultaneously.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples

Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaces the Perkin Elmer 403

NOTES:

The values for the recoveries are unknown. The average value is used.

pyrophosphate ext. fe
QUALITY CONTROL DATA FROM 08/01/87 TO 11/12/87

Lab: Dorset Soils

Analytical Range: 0.04 to 1.00 % as fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	14	0.75	0.75	-0.00	0.019
b :	14	0.25	0.24	-0.01	0.014
a+b :	14	1.00	0.99	-0.01	0.028
a-b :	14	0.50	0.51	0.01	0.019

s.d.(AB): Sw(within run): 0.013 S(between runs): 0.017 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 to 1.07 for A+B
0.45 to 0.55 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	22	0.58	0.57	0.046
r2 :	22	0.26	0.24	0.033
r3 :	22	0.67	0.68	0.054

DUPLICATES:

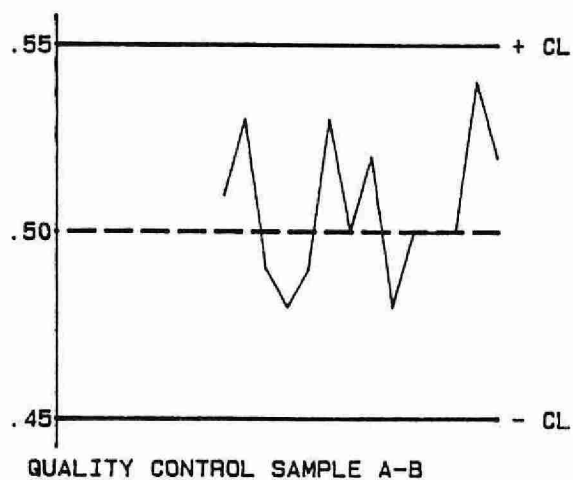
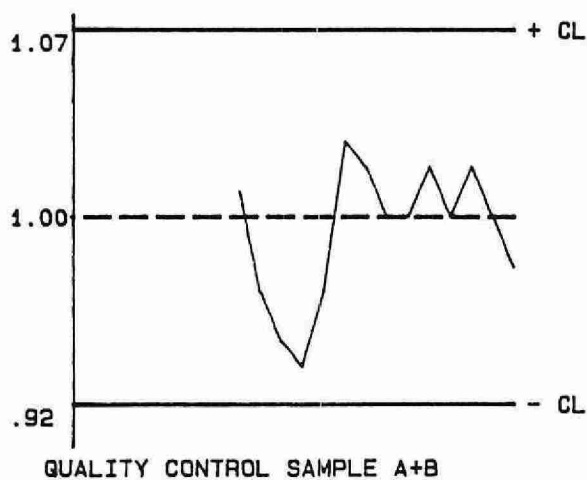
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
39	0.00 - 0.20	0.008	8.3
23	0.20 - 0.50	0.012	3.8
7	0.50 - 1.00	0.010	1.4
69	Overall	0.010	N/A

OTHER CHECKS:

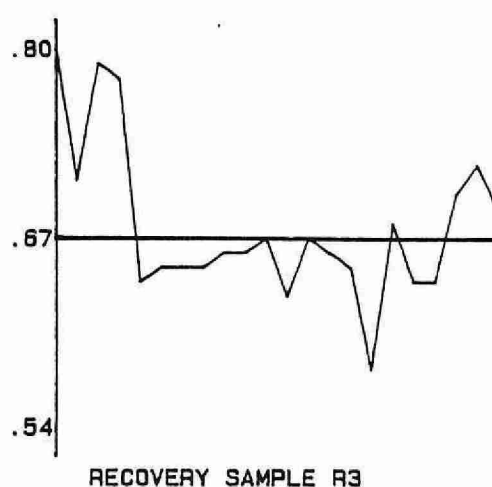
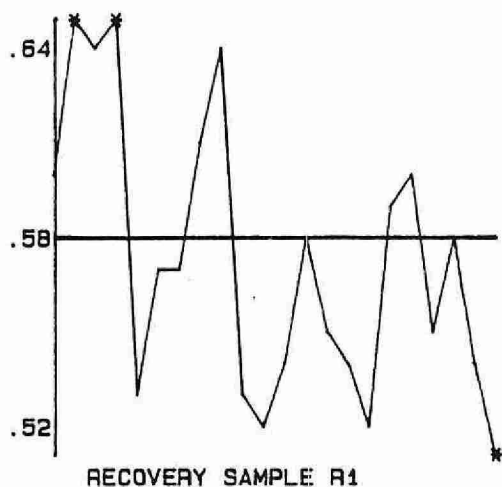
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	22	0.00	0.000

QUALITY CONTROL GRAPHS PYROPHOSPHATE EXT. FE (% AS FE)

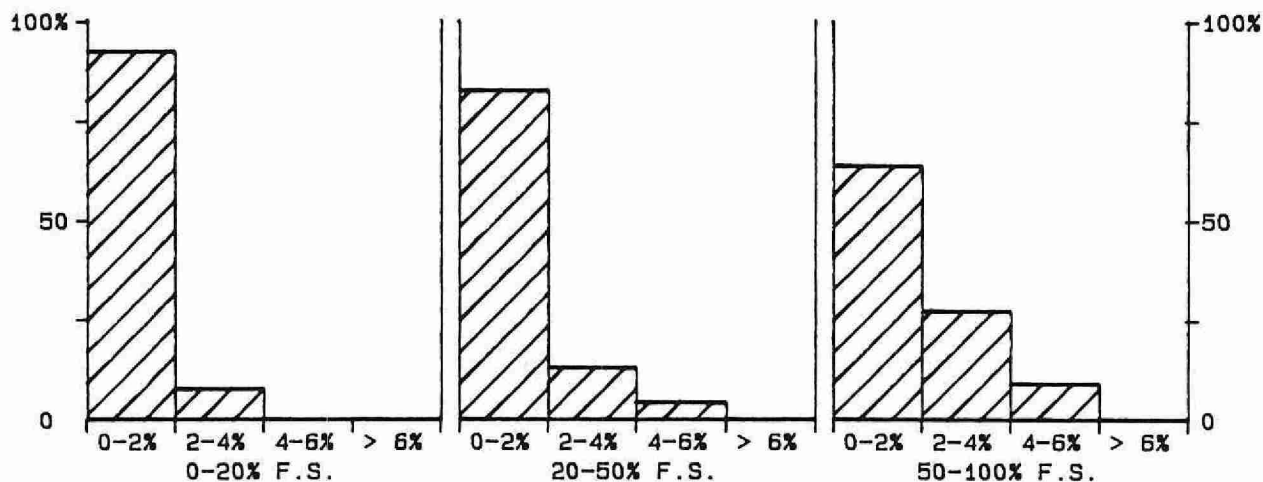
FROM: 08/01/87
TO: 11/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



***** TOTAL LEAD - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	PBUT	Units	: ug/g as Pb
Work Station Code :	DOHMTE	Unit Code	: 073882
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Pb by AAS at 217.0 nm using an air-acetylene flame. Approximate absorbance: 0.1 at the full scale value. Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
 2 method blanks, round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C
06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

TOTAL LEAD - SOIL
QUALITY CONTROL DATA FROM 09/02/87 TO 01/12/87

Lab: Dorset Soils

Analytical Range: 7.2 to 50.0 ug/g as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	39.0	39.1	0.1	2.06
b :	8	14.0	14.1	0.1	2.05
a+b :	8	53.0	53.1	0.1	2.99
a-b :	8	25.0	25.0	-0.0	2.82

s.d.(AB): Sw(within run): 1.99 S(between runs): 2.06 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

41.0 to 65.0 for A+B
 17.0 to 33.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	23	9.0	8.9	2.76
r2 :	23	18.5	18.6	3.63
r3 :	23	27.0	27.2	3.70

DUPLICATES:

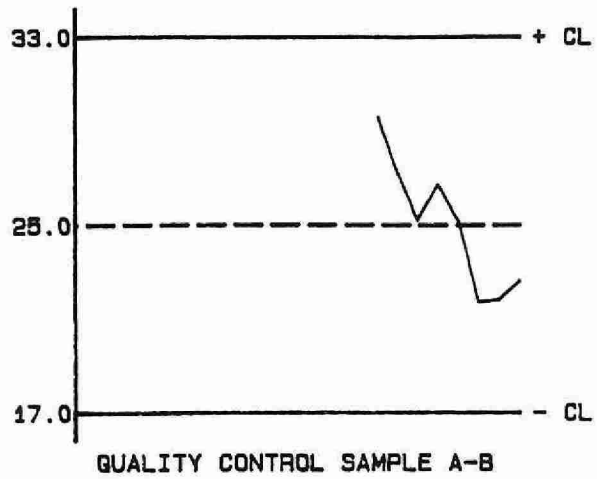
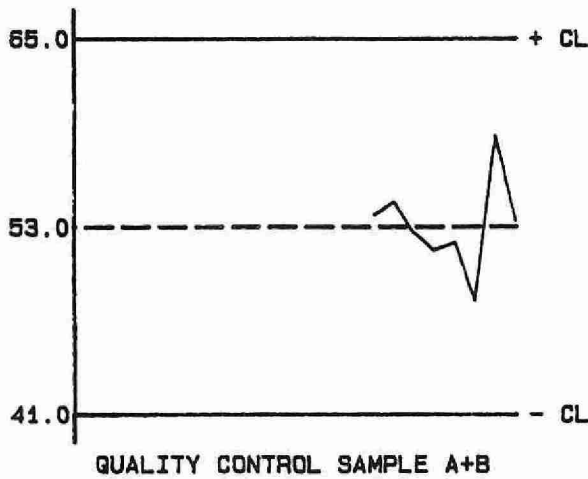
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
33	0.0 - 12.5	1.45	19.0
12	12.5 - 25.0	2.16	12.6
15	25.0 - 50.0	1.59	5.0
60	Overall	1.65	N/A

OTHER CHECKS:

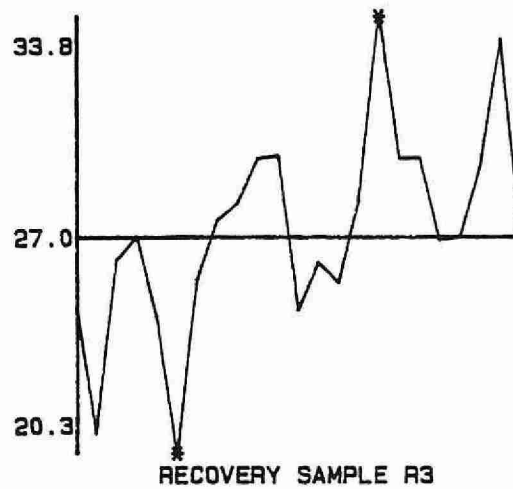
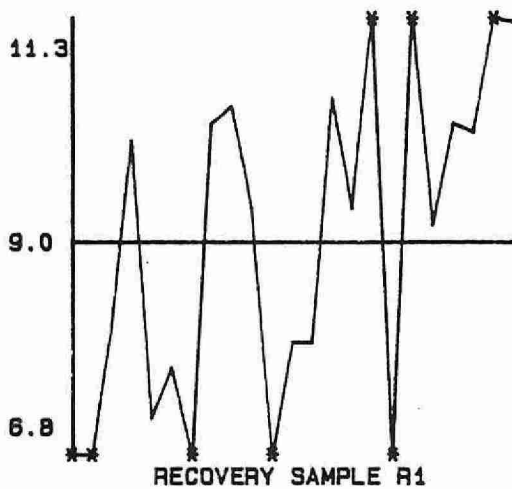
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	23	0.7	1.47

QUALITY CONTROL GRAPHS TOTAL LEAD - SOIL (UG/G AS PB)

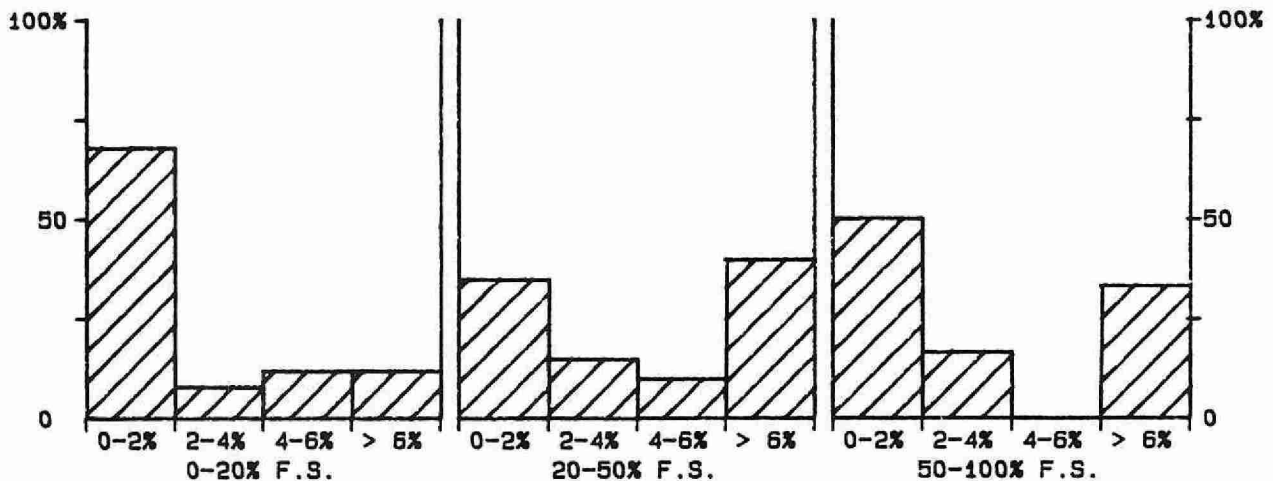
FROM: 09/02/87
TO: 01/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/G AS PB

***** LEAD *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: PBUT	Units	: ug/L as Pb
Work Station Code	: DOASV	Unit Code	: 063882
Method Code	: 001PP2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 100 mL
Container : 500 mL, acid washed Telfon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a EG + GROTEL glassy carbon electrode. Change in current when lead is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

EG & G (Princeton Applied Research) Model 384 Analyzer with ROTEL ROTATING GLASSY CARBON Electrode Stand.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.3 T value: 1.5

CALIBRATION:

BL plus 2 standards daily

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA + EPA standard.
Duplicate : End of every run (approximately every 8 samples)

TOTAL LEAD
QUALITY CONTROL DATA FROM 02/04/87 TO 23/12/87

Lab: Dorset

Analytical Range: 0.06 to 2.00 ug/l as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	65	0.24	0.20	-0.04	0.067
b :	65	0.06	0.05	-0.01	0.016
a+b :	65	0.30	0.26	-0.04	0.070
a-b :	65	0.18	0.15	-0.03	0.069

s.d.(AB): Sw(within run): 0.049 S(between runs): 0.049 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

-0.01 to 0.61 for A+B
-0.03 to 0.39 for A-B

DUPLICATES:

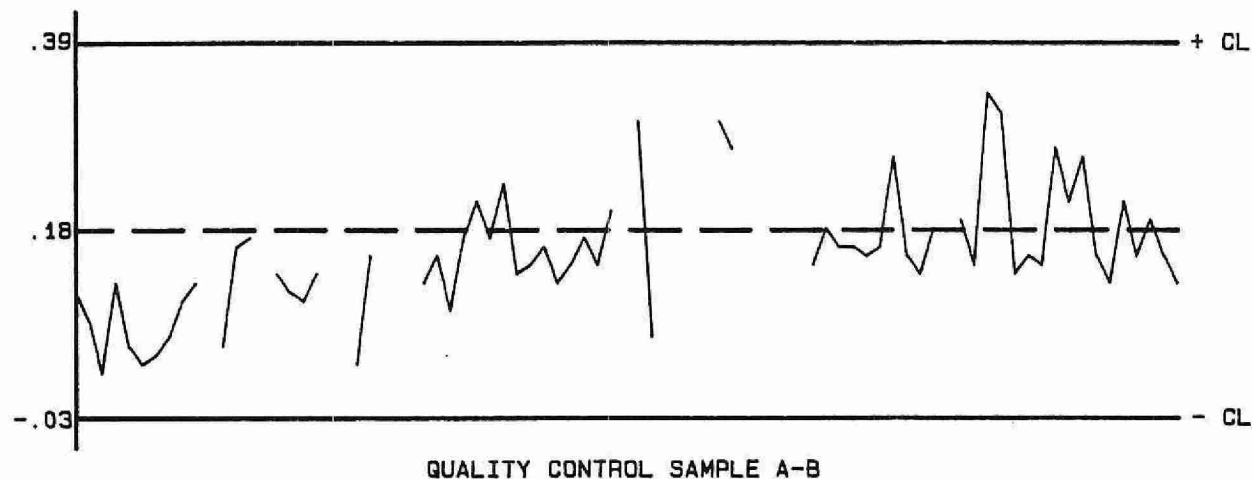
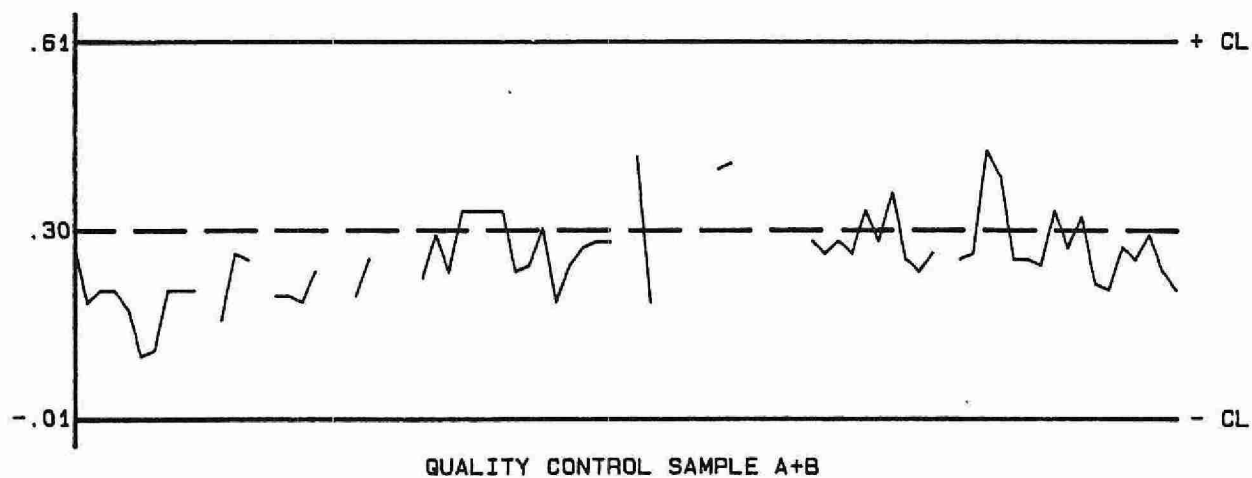
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.00 - 0.10	0.012	16.9
9	0.10 - 0.20	0.037	24.7
12	0.20 - 0.50	0.071	29.1
10	0.50 - 1.00	0.131	18.2
5	1.00 - 2.00	0.277	21.7
45	Overall	0.118	N/A

OTHER CHECKS:

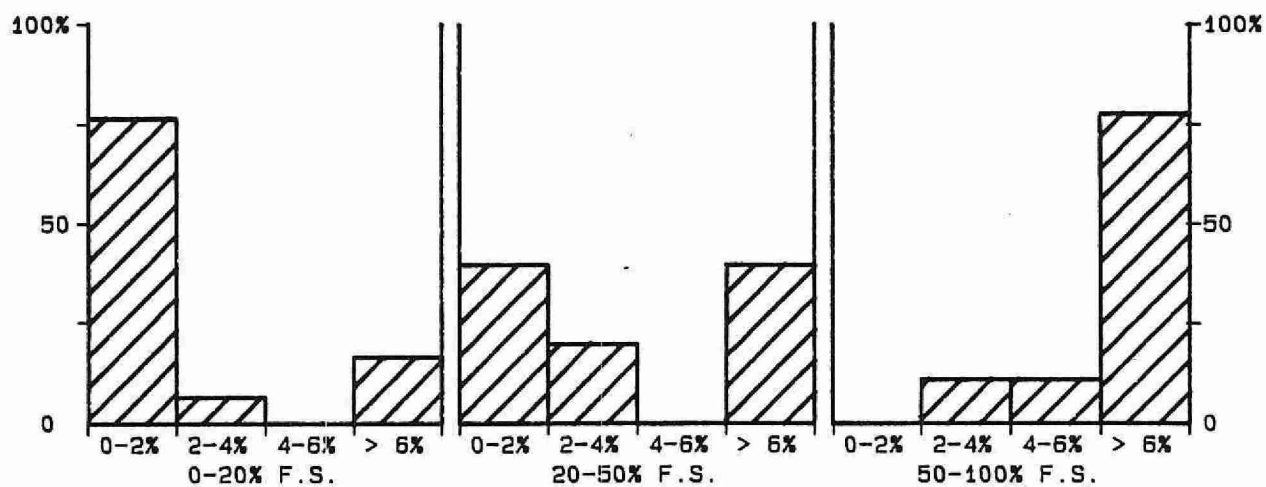
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	65	0.00	0.006

QUALITY CONTROL GRAPHS TOTAL LEAD (UG/L AS PB)

FROM: 02/04/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** MAGNESIUM *****

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 18/05/79
Lis Test Name Code : MGUR Units : mg/L as Mg
Work Station Code : PRAA Unit Code : 064812
Method Code : 001CA1 Supervisor : F. Tomassini
Sample Type/Matrix : Precipitation, Throughfall, Filter extracts

SAMPLING:

Quantity Required : 5 mL
Container : Pet-500 mL Jars

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame.
Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS;

07/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

MAGNESIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Atomic Absorption

Analytical Range: 0.020 to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	66	0.300	0.304	0.004	0.0043
b :	66	0.050	0.054	0.004	0.0028
a+b :	66	0.350	0.358	0.008	0.0057
a-b :	66	0.250	0.249	-0.001	0.0046

s.d.(AB): Sw(within run): 0.0033 S(between runs): 0.0036 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.327 to 0.372 for A+B
0.235 to 0.265 for A-B

DUPLICATES:

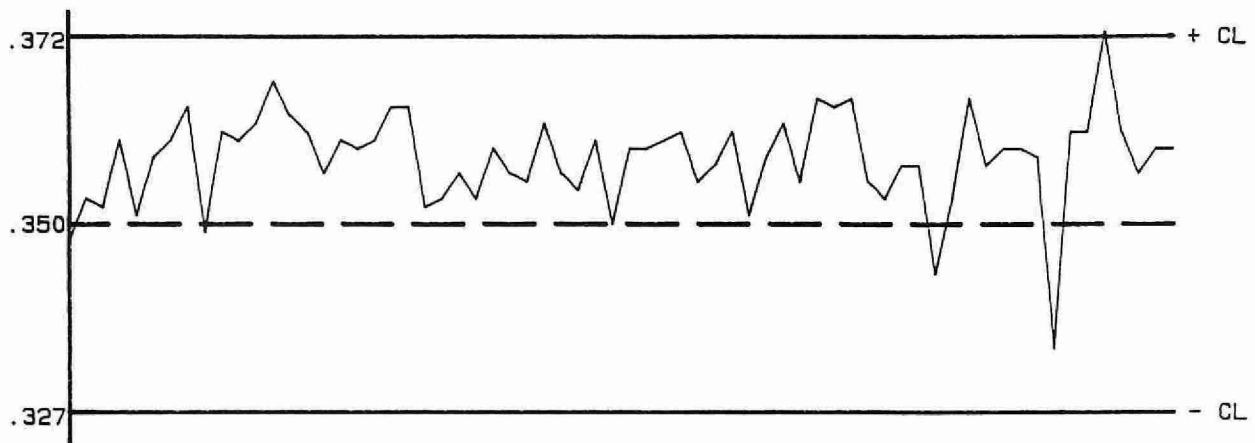
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
68	0.000 - 0.050	0.0041	14.9
27	0.050 - 0.100	0.0054	7.9
20	0.100 - 0.250	0.0069	4.2
15	0.250 - 0.500	0.0136	3.5
130	Overall	0.0066	N/A

QUALITY CONTROL GRAPHS

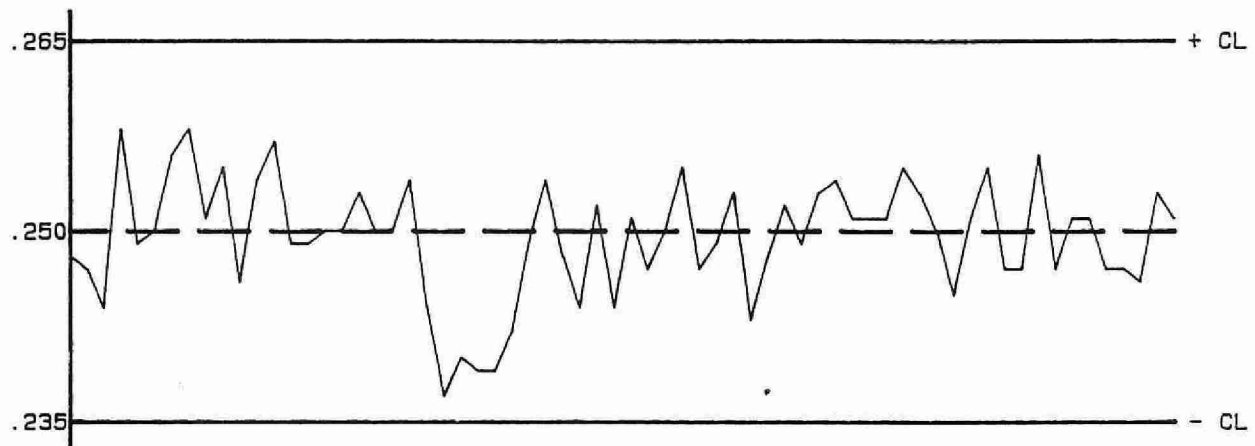
MAGNESIUM (MG/L AS MG)

FROM: 06/01/87

TO: 23/12/87

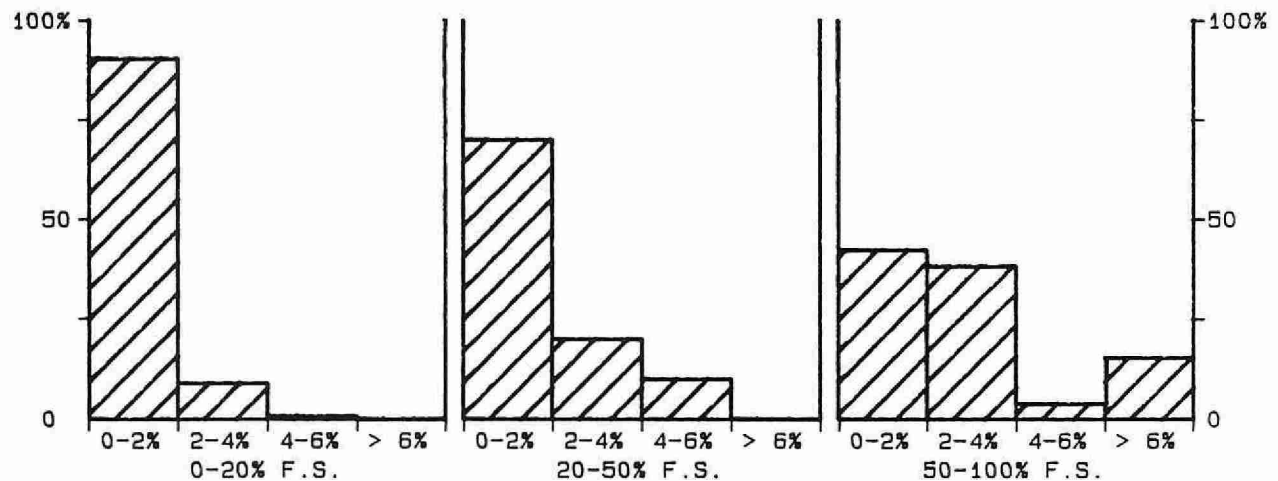


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
 — CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): .5 MG/L AS MG

***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: F. Tommassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.16 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards and LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

01/12/81 -Calibration range became 5.00 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMCAMGH) was added; full scale: 1.00 mg/L. This range is currently restricted to special programs.
01/09/84 -Analytical range (RMCAMGH) was increased from 5.00 to 10.0 mg/L full scale. Calibration technique was no longer determined simultaneously.
25/09/85 -Calibration range became 7.0 mg/L full scale; second analytical range was dropped. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 1.00, 7.00, and 10.0 mg/L as Mg full scale.
06/04/87 -Changed full scale to 10 mg/L as Mg
 Number of cal. standards changed from 10 to 11
 Number of QC standards changed from 2 to 3 plus one LTB

MAGNESIUM
QUALITY CONTROL DATA FROM 05/01/87 TO 02/04/87

Lab: Atomic Absorption

Analytical Range: 0.10 to 7.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	24	5.60	5.78	0.18	0.036
b :	24	0.49	0.50	0.01	0.012
a+b :	24	6.09	6.27	0.18	0.043
a-b :	24	5.11	5.28	0.17	0.032

s.d.(AB): Sw(within run): 0.023 S(between runs): 0.027 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77 to 6.40 for A+B
 4.90 to 5.32 for A-B

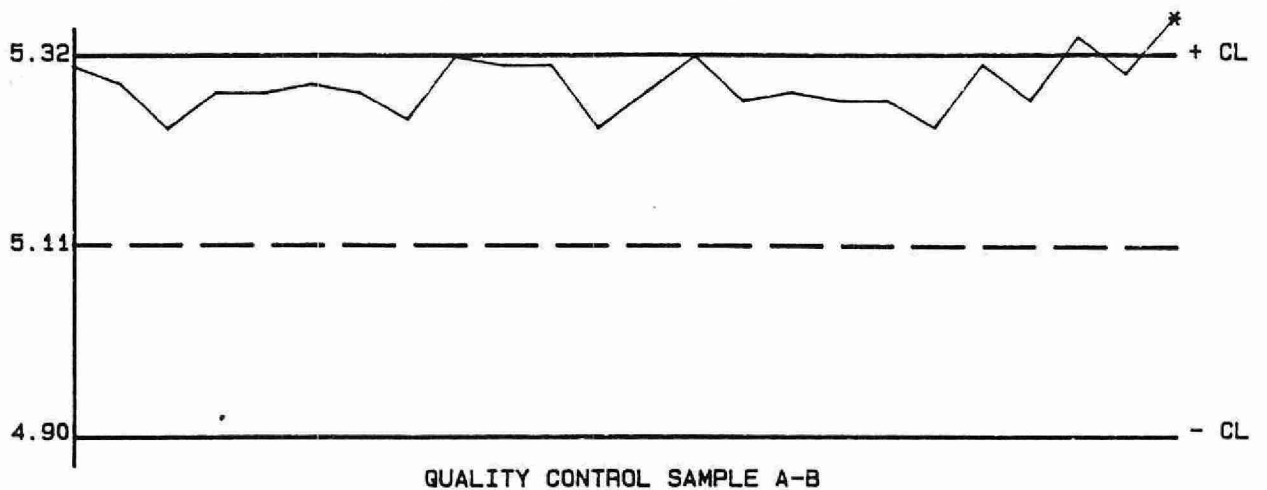
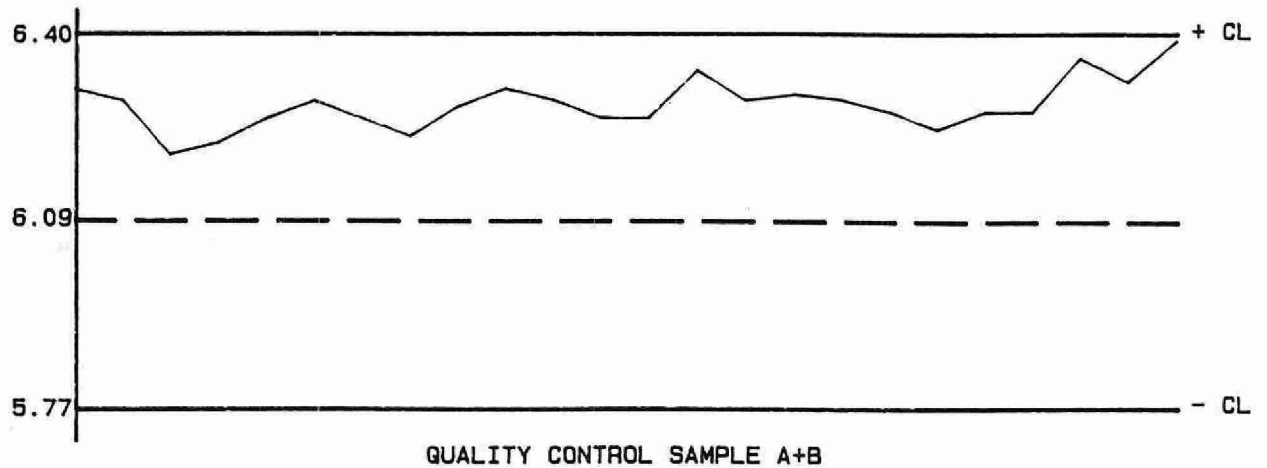
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	6	0.00 - 0.35	0.019	9.7
	28	0.35 - 0.70	0.033	5.9
	13	0.70 - 1.40	0.041	4.4
	11	1.40 - 3.50	0.132	5.8
	5	3.50 - 7.00	0.079	1.7
	63	Overall	0.066	N/A

OTHER CHECKS:

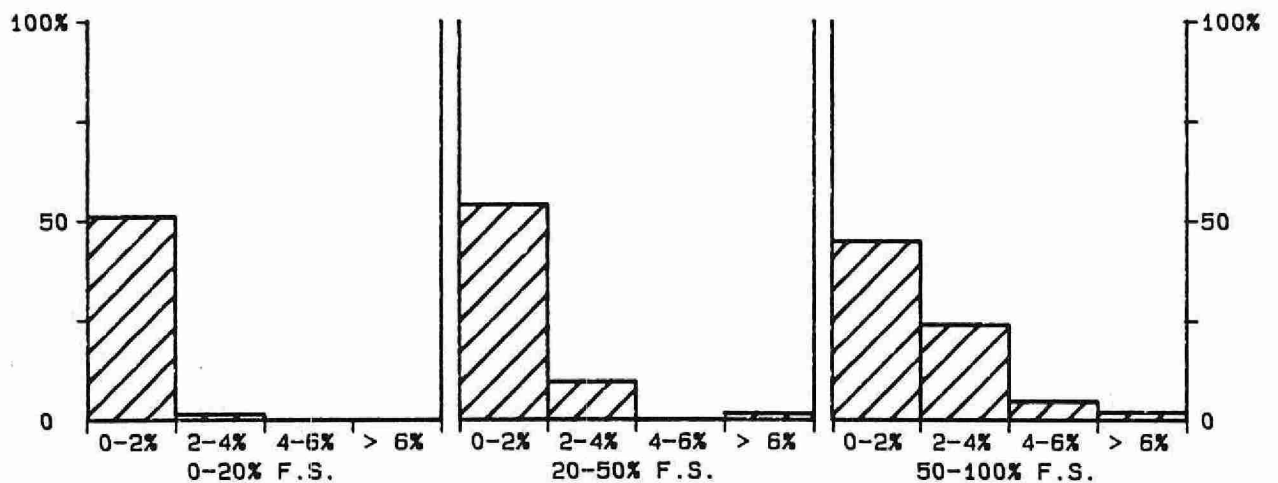
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	20	1.135	0.0601
Long Term Blank :	24	0.00	0.010

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 05/01/87
TO: 02/04/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 7 MG/L AS MG

MAGNESIUM
QUALITY CONTROL DATA FROM 08/04/87 TO 31/12/87

Lab: Atomic Absorption

Analytical Range: 0.21 to 10.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	89	8.00	7.95	-0.05	0.081
b :	89	2.00	2.00	0.00	0.030
a+b :	89	10.00	9.96	-0.04	0.090
a-b :	89	6.00	5.95	-0.05	0.082
c :	89	2.00	2.00	0.00	0.030
d :	89	0.500	0.546	0.046	0.0357
c+d :	89	2.500	2.548	0.048	0.0497
c-d :	89	1.500	1.455	-0.045	0.0439

s.d.(AB): Sw(within run): 0.058 S(between runs): 0.061 S/Sw: 1.05
s.d.(CD): Sw(within run): 0.031 S(between runs): 0.033 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55 to 10.45 for A+B
5.70 to 6.30 for A-B
2.305 to 2.695 for C+D
1.370 to 1.630 for C-D

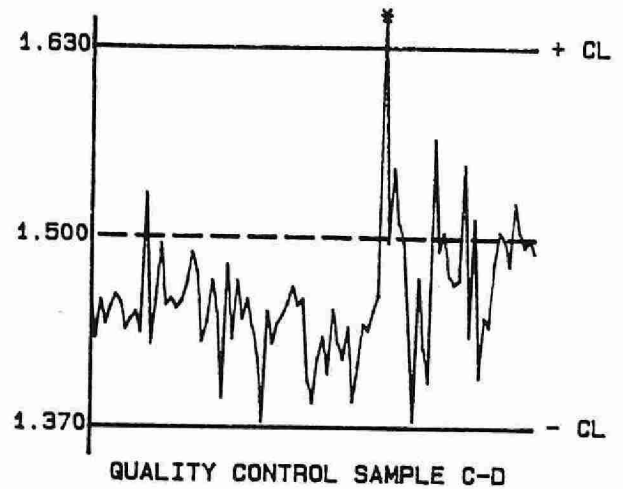
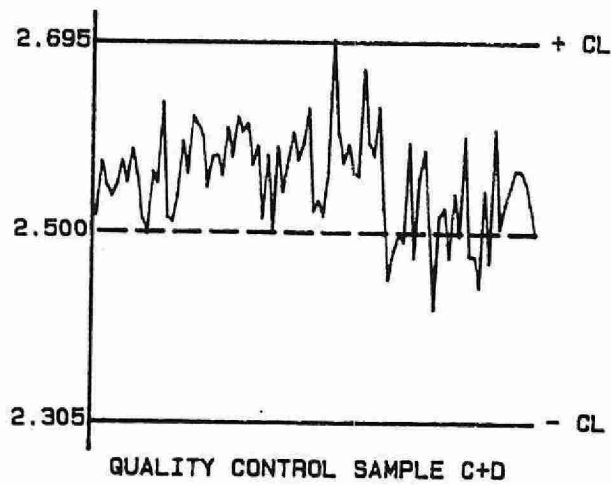
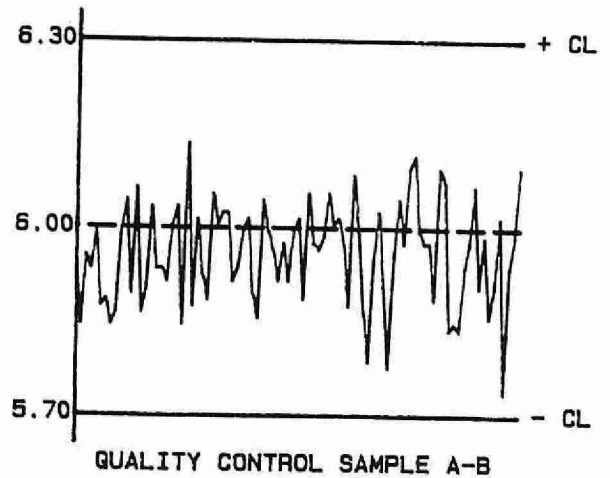
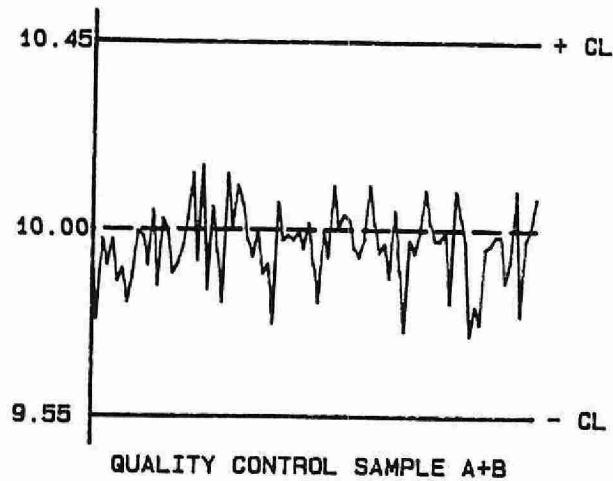
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	100	0.00 - 1.00	0.042	7.2
	33	1.00 - 2.00	0.079	5.3
	34	2.00 - 4.00	0.121	4.1
	32	4.00 - 7.00	0.116	2.4
	12	7.00 - 10.00	0.144	1.7
	211	Overall	0.086	N/A

OTHER CHECKS:

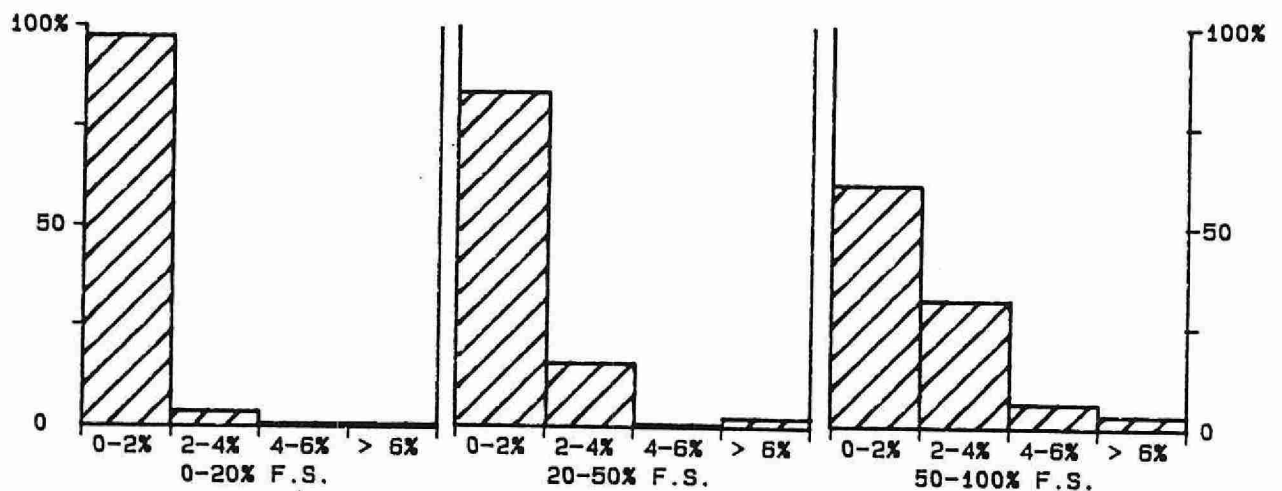
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	86	1.183	0.0633
Long Term Blank :	89	-0.00	0.008

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 08/04/87
TO: 31/12/87



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** MAGNESIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	08/04/86
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 001CA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.187 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/07/82 -The method introduced on this date differ slightly from Method B for magnesium in HAMES in that full scale was 20.0 mg/L; concentrations of QC standards were adjusted accordingly.
08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from 80 to 35 mg/L as Mg. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.
03/03/87 -Changed full scale to 50 mg/L as Mg
 Number of cal. standards changed from 10 to 11
 Number of QC standards changed from 2 to 3 plus LTB

MAGNESIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 25/02/87

Lab: Atomic Absorption

Analytical Range: 0.45 to 35.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	21	28.00	28.68	0.68	0.293
b :	21	2.45	2.43	-0.02	0.099
a+b :	21	30.45	31.11	0.66	0.337
a-b :	21	25.55	26.25	0.70	0.280

s.d.(AB): Sw(within run): 0.198 S(between runs): 0.219 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

28.87 to 32.02 for A+B
 24.50 to 26.60 for A-B

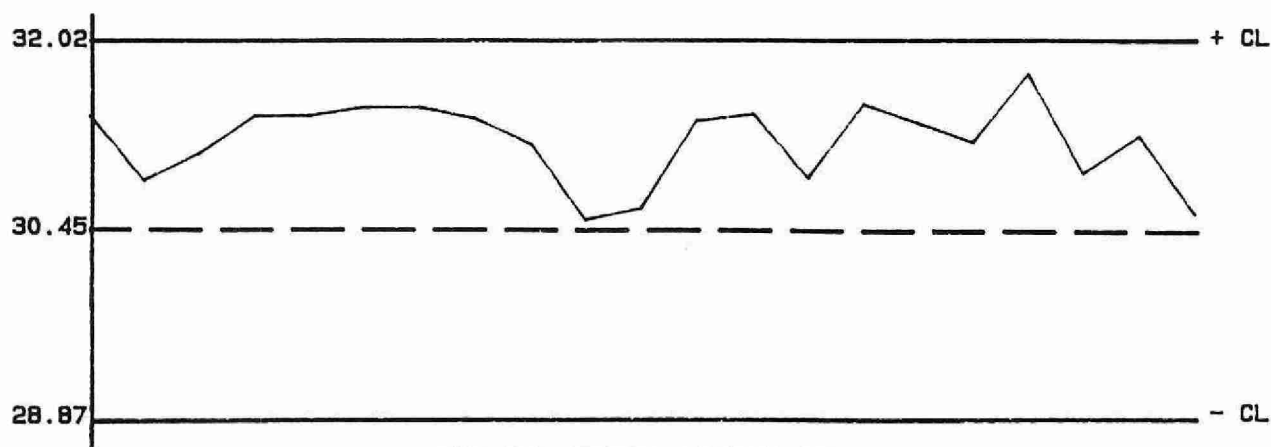
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	5	0.00 - 1.75	0.090	9.3
	3	1.75 - 3.50	0.065	2.7
	4	3.50 - 7.00	0.065	1.4
	20	7.00 - 17.50	0.188	2.1
	18	17.50 - 35.00	0.819	3.3
	50	Overall	0.507	N/A

OTHER CHECKS:

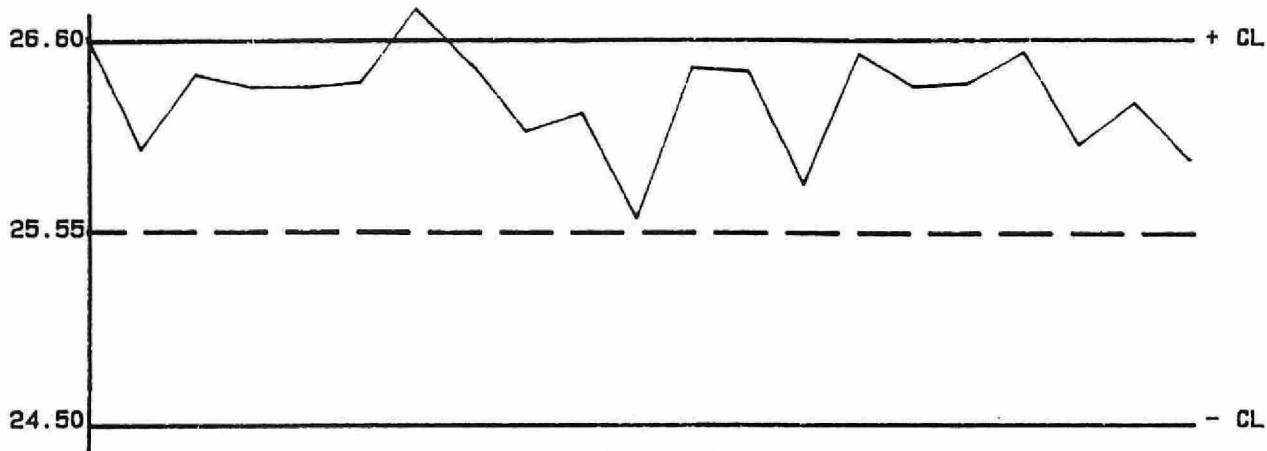
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	20	1.144	0.0640
Long Term Blank :	21	-0.02	0.047

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 06/01/87
TO: 26/02/87

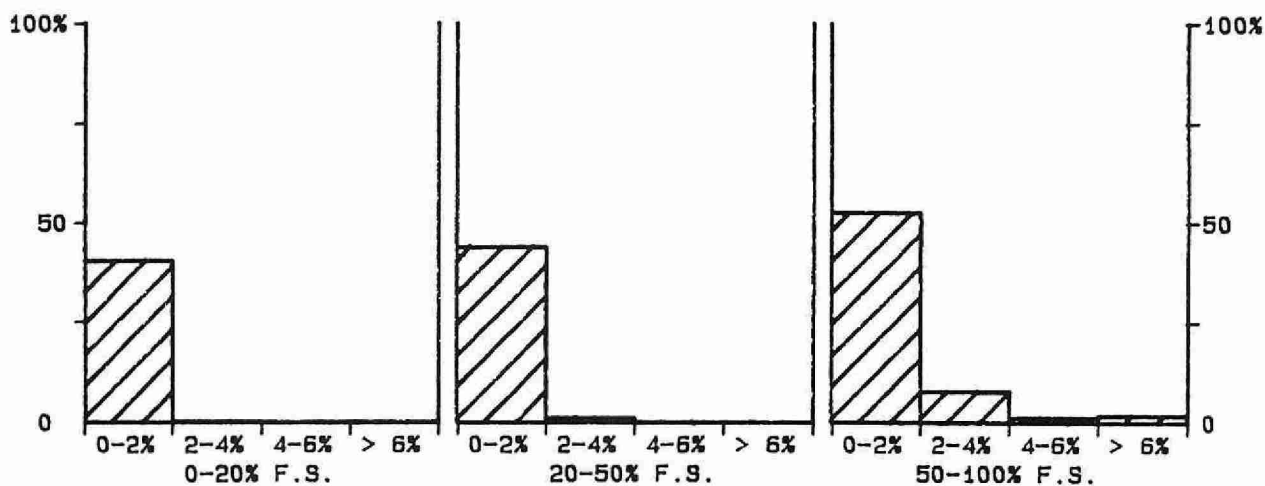


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 35 MG/L AS MG

MAGNESIUM
QUALITY CONTROL DATA FROM 06/03/87 TO 29/12/87

Lab: Atomic Absorption

Analytical Range: 1.01 to 50.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	135	40.00	39.91	-0.09	0.617
b :	135	10.00	10.08	0.08	0.204
a+b :	135	50.00	49.99	-0.01	0.709
a-b :	135	30.00	29.83	-0.17	0.585
c :	135	10.00	10.08	0.08	0.204
d :	135	2.50	2.61	0.11	0.241
c+d :	135	12.50	12.69	0.19	0.373
c-d :	135	7.50	7.47	-0.03	0.244

s.d.(AB): Sw(within run): 0.414 S(between runs): 0.460 S/Sw: 1.11
s.d.(CD): Sw(within run): 0.173 S(between runs): 0.223 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.75 to 52.25 for A+B
28.50 to 31.50 for A-B
11.45 to 13.55 for C+D
6.80 to 8.20 for C-D

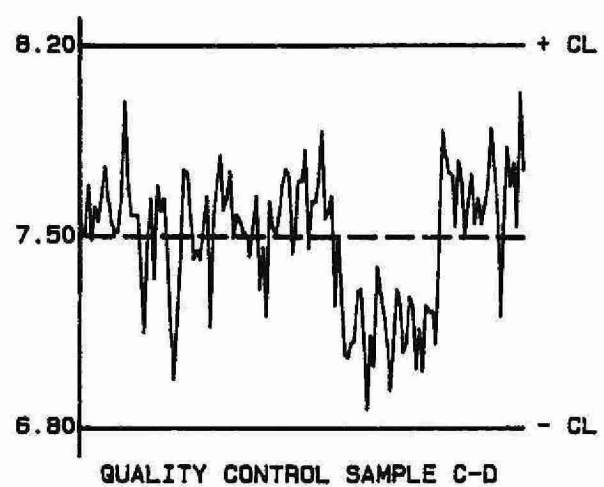
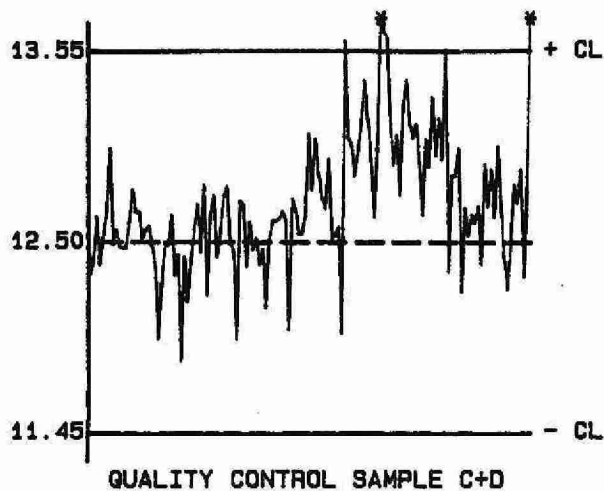
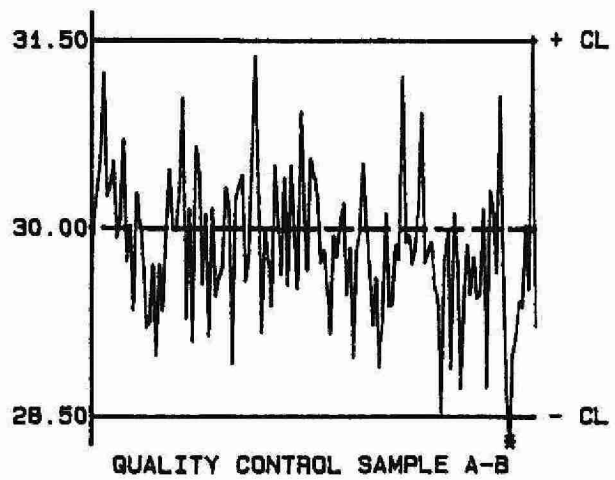
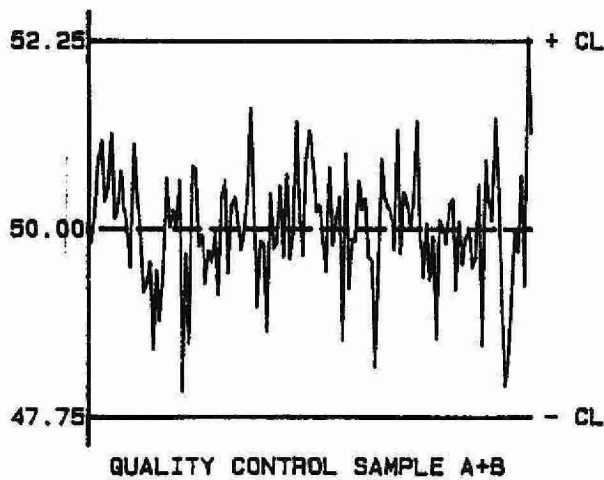
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	32	0.00 - 2.50	0.202	16.4
	45	2.50 - 5.00	0.094	2.4
	83	5.00 - 10.00	0.163	2.0
	171	10.00 - 30.00	0.288	1.5
	37	30.00 - 50.00	0.617	1.6
	368	Overall	0.296	N/A

OTHER CHECKS:

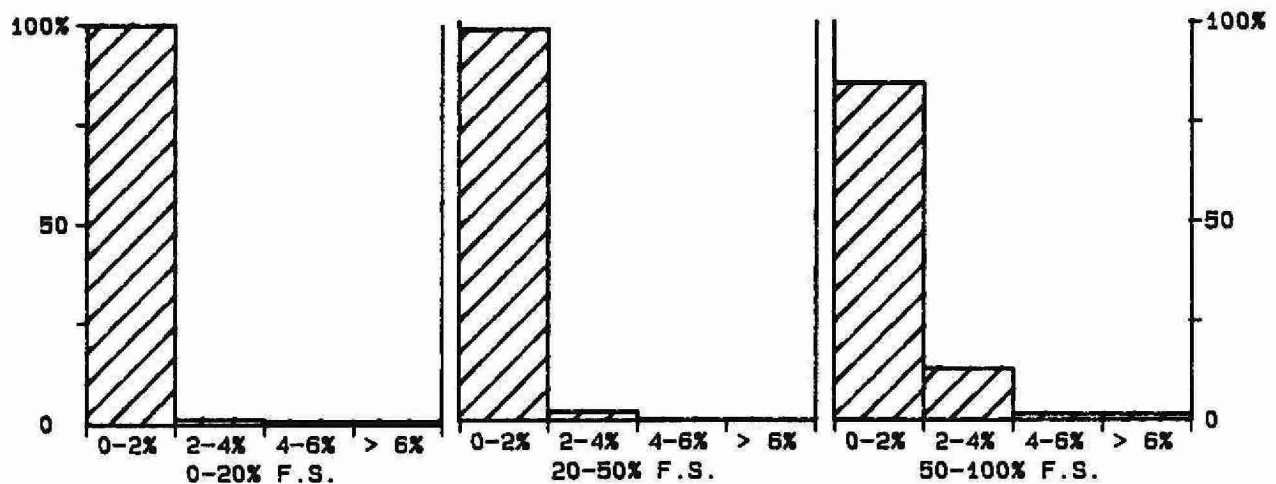
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	131	1.186	0.0696
Long Term Blank :	125	-0.01	0.055

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 03/03/87
TO: 29/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** MAGNESIUM - SOIL (Xsc) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: MGESC	Units	: meq/100 g Mg
Work Station Code	: DOCACTION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 6 g dry
Container : Glass jar

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Mg by AAS at 285.2 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level.
Aluminum, calcium; and potassium are determined simultaneously.

INSTRUMENTATION:

-Varian AA1275 with programmable sampler changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples (run occasionally).
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -three g sample used for all soil types (6 g previously used for sandy soils)
01/06/86 -Varian AA1275 replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown - average value used.

MAGNESIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 03/04/87 TO 23/12/87

Lab: Dorset Soils

Analytical Range: 0.10 to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	18	1.88	1.90	0.02	0.049
b :	19	0.63	0.65	0.02	0.027
a+b :	18	2.50	2.55	0.05	0.065
a-b :	18	1.25	1.25	0.00	0.046

s.d.(AB): Sw(within run): 0.033 S(between runs): 0.040 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.69 for A+B
1.13 to 1.37 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	19	0.05	0.07	0.016
r2 :	19	2.29	2.10	0.119
r3 :	19	0.29	0.30	0.030

DUPLICATES:

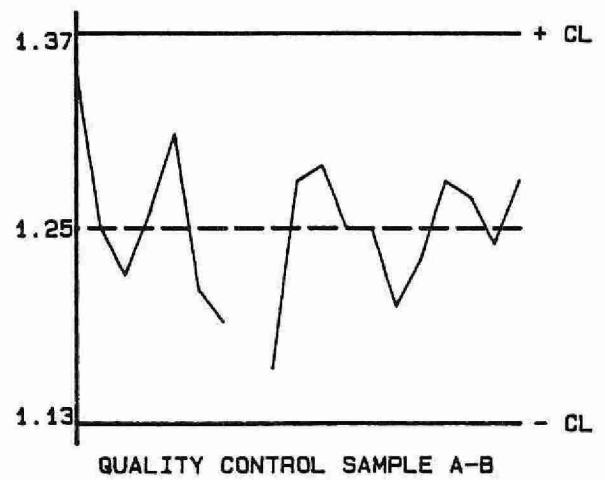
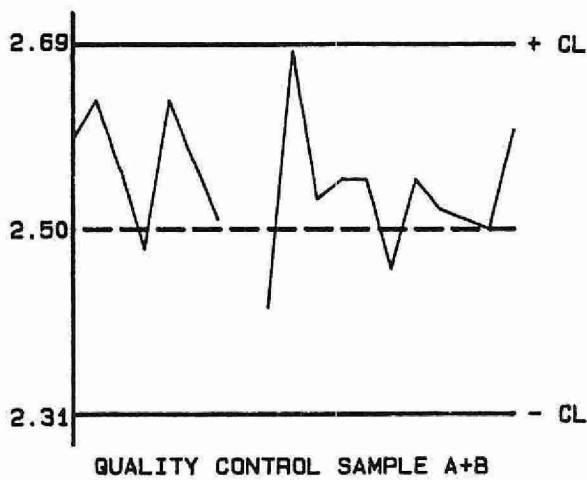
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0.00 - 0.50	0.019	9.7
17	0.50 - 1.25	0.044	5.1
12	1.25 - 2.50	0.069	4.1
57	Overall	0.042	N/A

OTHER CHECKS:

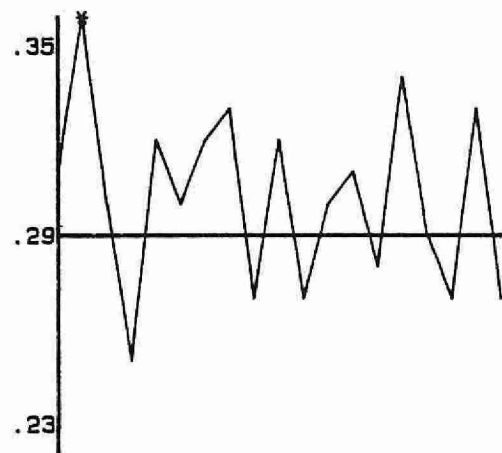
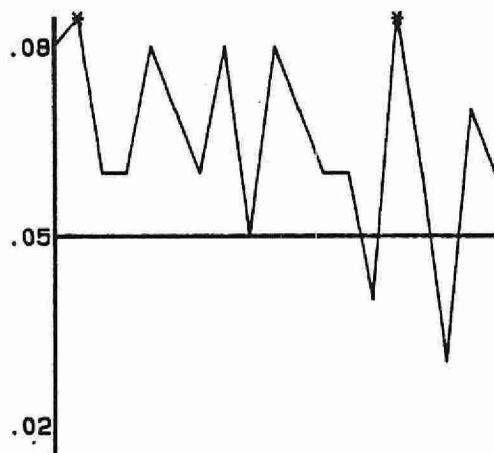
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	19	0.00	0.007

QUALITY CONTROL GRAPHS MAGNESIUM - SOIL (XSC) (MEQ/100G)

FROM: 03/04/87
TO: 23/12/87



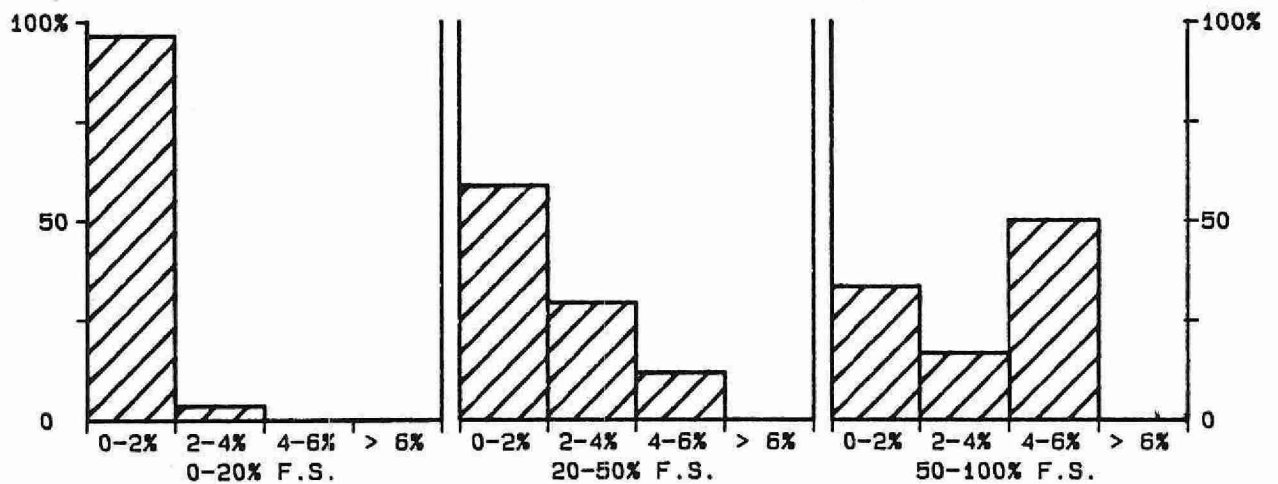
--- EXPECTED VALUE
— CONTROL LIMIT (CL)



RECOVERY SAMPLE R1

RECOVERY SAMPLE R3

* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2.5 MEQ/100G

***** TOTAL NICKEL - SOIL *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: NIUT	Units	: ug/g as Ni
Work Station Code	: DOHMTE	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Ni by AAS at 232.0 nm using an air-acetylene flame. Approximate absorbance: 0.2 at the full scale value. Copper, lead and zinc are also determined on the same extract.

INSTRUMENTATION:

-Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
-Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
 2 method blanks, round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C
06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

TOTAL NICKEL - SOIL
QUALITY CONTROL DATA FROM 09/02/87 TO 12/12/87

Lab: Dorset Soils

Analytical Range: 3.8 to 50.0 ug/g as Ni

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	36.3	36.3	-0.0	1.33
b :	7	13.5	13.3	-0.2	1.69
a+b :	7	49.8	49.4	-0.4	1.18
a-b :	7	22.8	22.9	0.1	2.86

s.d.(AB): Sw(within run): 2.02 S(between runs): 1.52 S/Sw: 0.75

On any given day the calibration is accepted if the values obtained lie within the ranges:

42.3 to 57.3 for A+B
17.8 to 27.8 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	23	9.5	9.2	1.80
r2 :	23	28.5	28.0	2.64
r3 :	23	6.8	7.0	1.74

DUPLICATES:

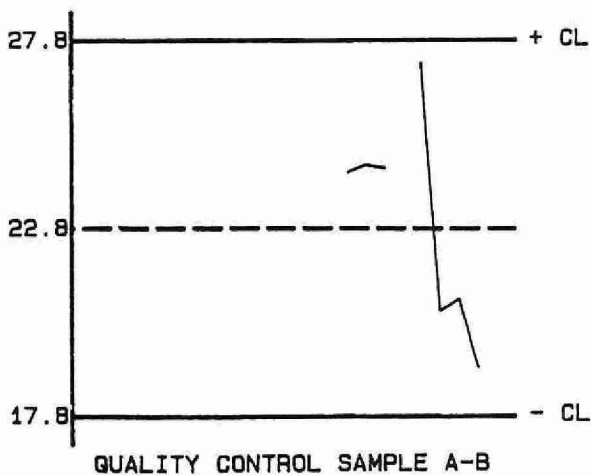
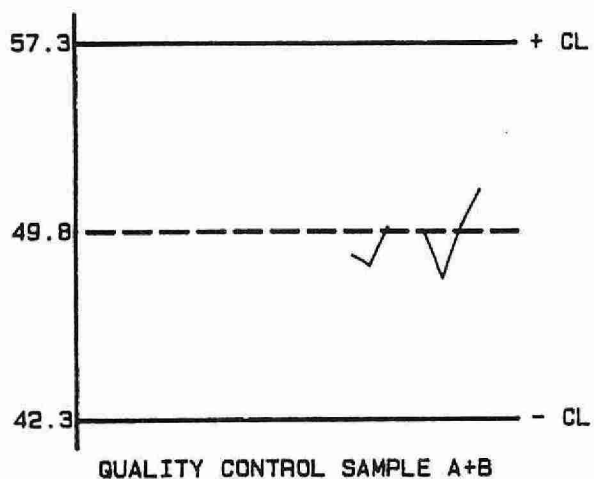
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0.0 - 12.5	0.76	9.2
31	12.5 - 25.0	0.91	5.4
9	25.0 - 50.0	1.64	5.1
68	Overall	0.99	N/A

OTHER CHECKS:

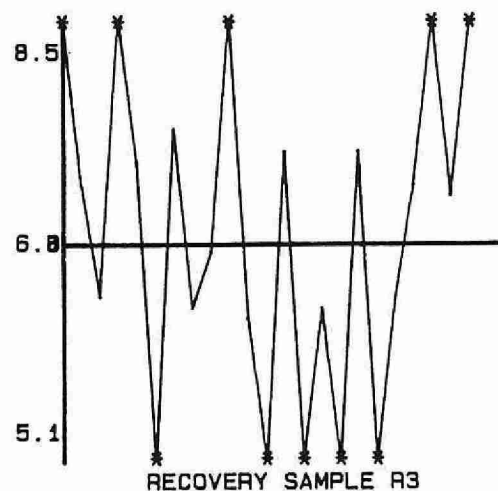
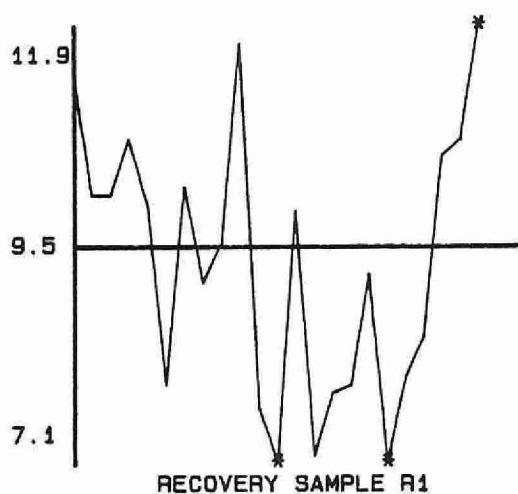
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	23	0.1	0.26

QUALITY CONTROL GRAPHS TOTAL NICKEL - SOIL (UG/G AS NI)

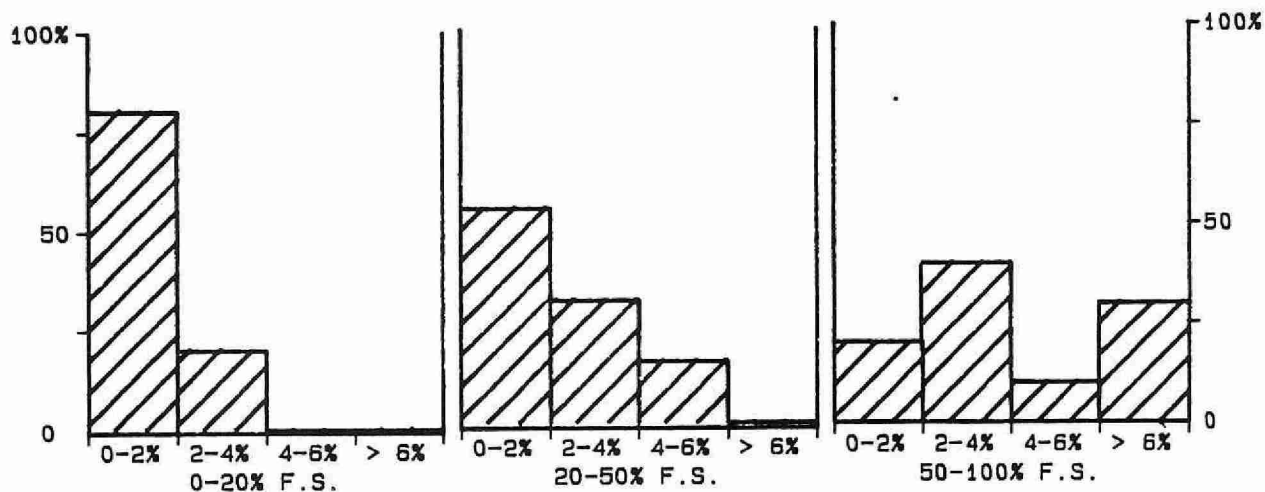
FROM: 09/02/87
TO: 12/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR,NNHTUR	Units	: mg/L as N
Work Station Code	: PRNUT	Unit Code	: 064807
Method Code	: 103CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.
Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005** T value: 0.025

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL plus 3 standards every 10 samples

MODIFICATIONS:

01/05/84 -The procedure introduced on this date is the same as Method A for nitrogen-ammonia in HAMES except that the samples are not filtered and the full scale concentration is 5.00 mg/L as N.

NITROGEN-AMMONIA PLUS AMMONIUM
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 0.025 to 5.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	63	4.00	4.00	-0.00	0.034
b :	63	0.80	0.80	0.00	0.022
a+b :	63	4.80	4.80	-0.00	0.046
a-b :	63	3.20	3.20	-0.00	0.034
c :	63	0.800	0.798	-0.002	0.0107
d :	63	0.200	0.191	-0.009	0.0076
c+d :	63	1.000	0.989	-0.011	0.0141
c-d :	63	0.600	0.606	0.006	0.0120

s.d.(AB): Sw(within run): 0.024 S(between runs): 0.029 S/Sw: 1.19
s.d.(CD): Sw(within run): 0.0085 S(between runs): 0.0093 S/Sw: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.57 to 5.02 for A+B
3.05 to 3.35 for A-B
0.850 to 1.150 for C+D
0.500 to 0.700 for C-D

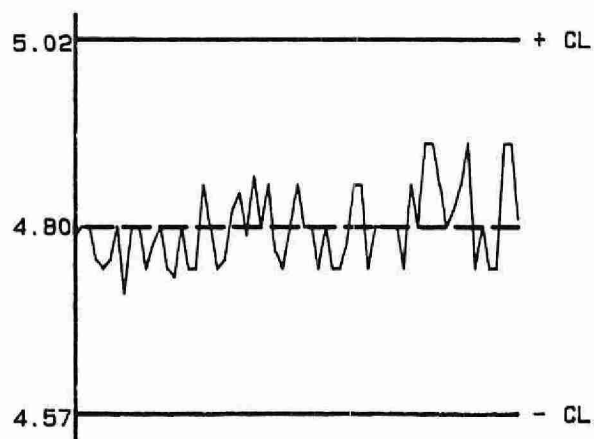
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	41	0.000 - 0.200	0.005	5.4
	48	0.200 - 0.500	0.0104	3.0
	39	0.500 - 1.000	0.1126	16.3
	34	1.00 - 2.50	0.015	1.2
	4	2.50 - 5.00	0.035	1.0
	166	Overall	0.056	N/A

OTHER CHECKS:

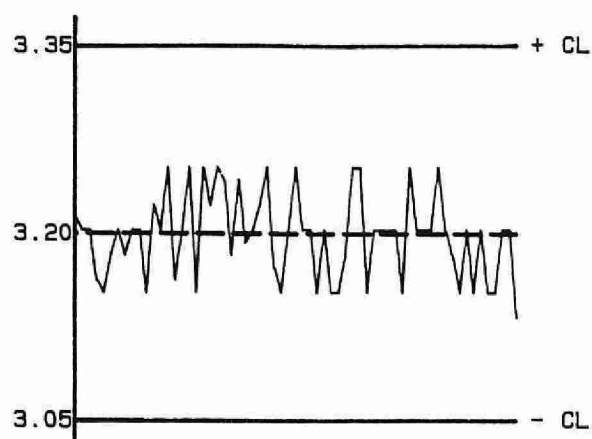
	Number of Data	Data Mean	Standard (1) Deviation
Long Term Blank :	61	0.923	0.2752

QUALITY CONTROL GRAPHS NITROGEN-AMMONIA PLUS AMMONIUM (MG/L AS N)

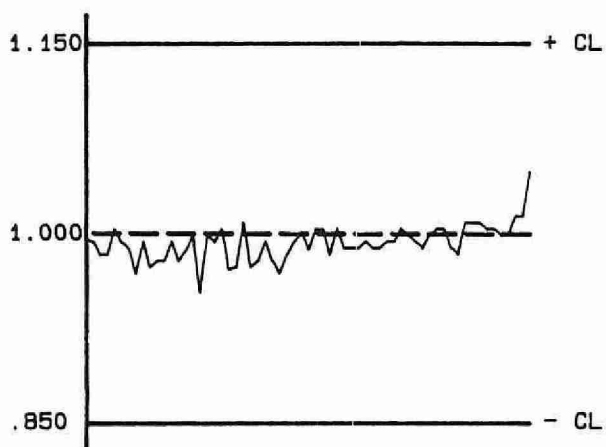
FROM: 07/01/87
TO: 23/12/87



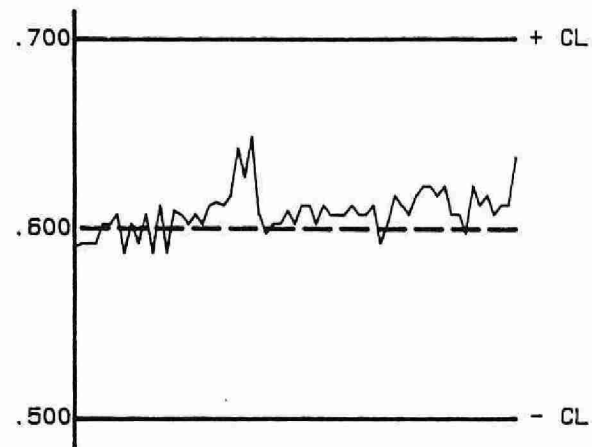
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

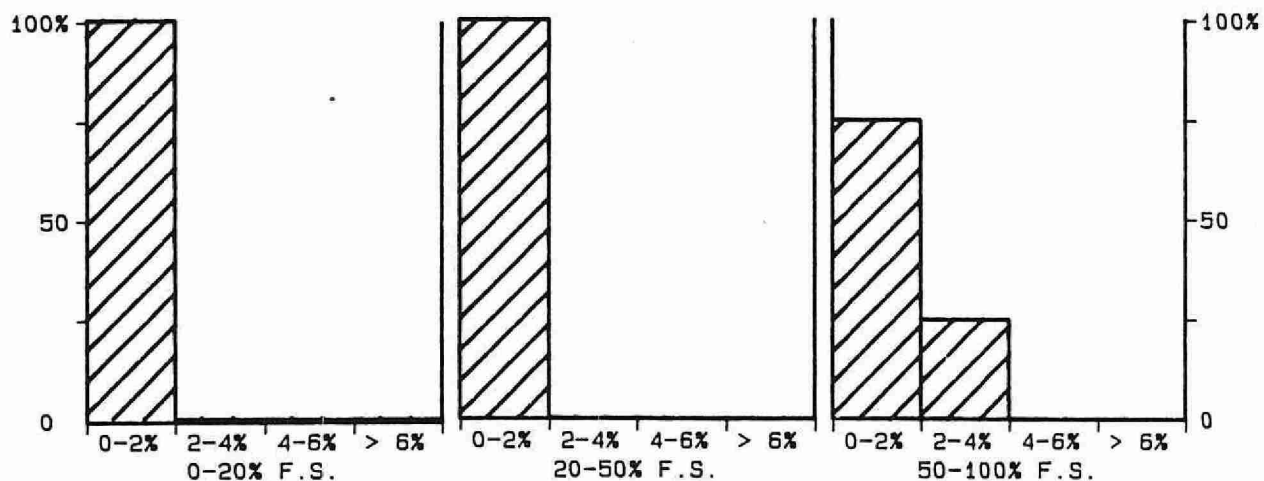


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS N

***** NITROGEN - AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 0.5 at the full scale level.

N.B. Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).

15/05/84 -Commodore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN - AMMONIA+AMMONIUM (NH₄FR 103DC2)
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 0.021 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	160	1.60	1.62	0.02	0.013
b :	160	0.40	0.40	0.00	0.008
a+b :	160	2.00	2.03	0.03	0.017
a-b :	160	1.20	1.22	0.02	0.013
c :	160	0.400	0.405	0.005	0.0072
d :	160	0.200	0.204	0.004	0.0067
c+d :	160	0.600	0.609	0.009	0.0121
c-d :	160	0.200	0.200	0.000	0.0069

s.d.(AB): Sw(within run): 0.009 S(between runs): 0.011 S/Sw: 1.17
s.d.(CD): Sw(within run): 0.0049 S(between runs): 0.007 S/Sw: 1.43

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91 to 2.09 for A+B
1.14 to 1.26 for A-B
0.577 to 0.622 for C+D
0.185 to 0.215 for C-D

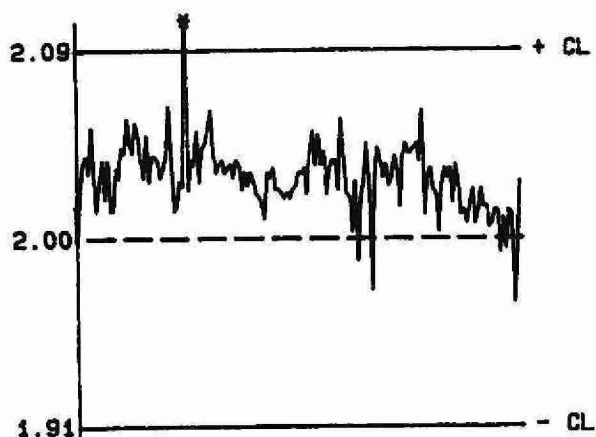
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
169	0.000 - 0.040	0.0043	18.3
131	0.040 - 0.100	0.008	12.0
44	0.100 - 0.200	0.0152	10.9
27	0.200 - 0.400	0.0087	3.0
99	0.40 - 2.00	0.424	48.1
470	Overall	0.195	N/A

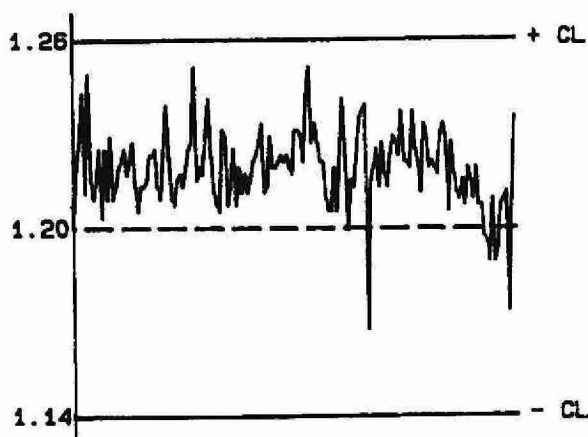
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	153	0.767	0.4282

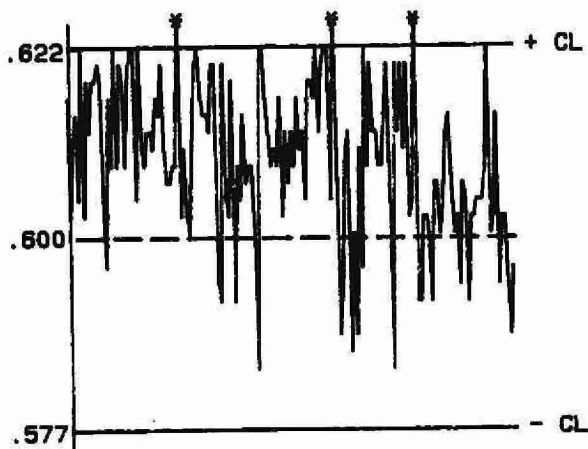
QUALITY CONTROL GRAPHS NITROGEN - AMMONIA+AMMONIUM (NNHTFR 103DC2) (MG/L AS N) FROM: 06/01/87 JDO: 23/12/87



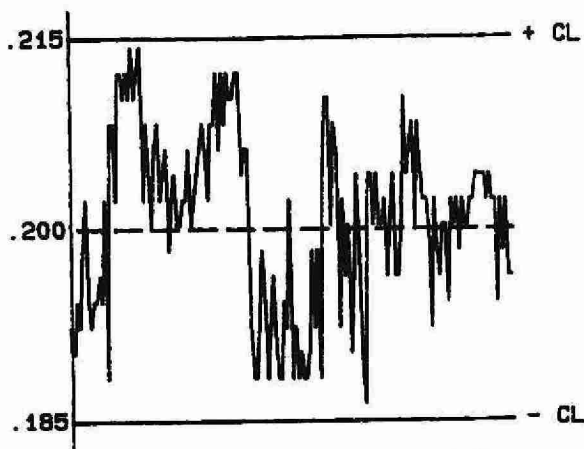
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

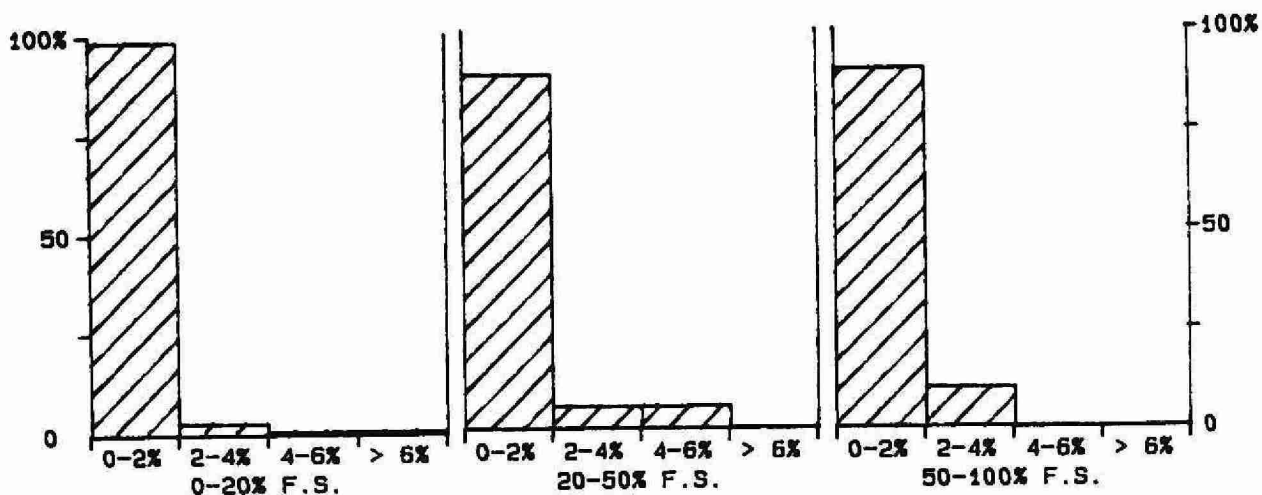


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
 --- CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 2 MG/L AS N

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/77
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. Approximate absorbance: 0.7 at the full scale level.

N.B. Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2. One analytical range is now used.

NITROGEN - AMMONIA PLUS AMMONIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 24/12/87

Lab: Colourimetry

Analytical Range: 0.44 to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	185	35.0	35.3	0.3	0.36
b :	185	14.0	14.1	0.1	0.22
a+b :	185	49.0	49.4	0.4	0.52
a-b :	185	21.0	21.1	0.1	0.29
c :	185	14.00	14.12	0.12	0.221
d :	185	3.50	3.45	-0.05	0.112
c+d :	185	17.50	17.57	0.07	0.297
c-d :	185	10.50	10.67	0.17	0.184

s.d.(AB): Sw(within run): 0.21 S(between runs): 0.30 S/Sw: 1.45
s.d.(CD): Sw(within run): 0.130 S(between runs): 0.175 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

46.8 to 51.2 for A+B
19.5 to 22.5 for A-B
16.60 to 18.40 for C+D
9.90 to 11.10 for C-D

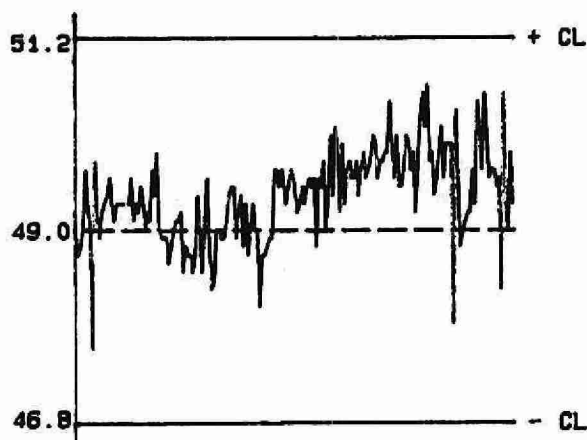
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	292	0.00 - 2.00	0.087	31.5
	33	2.00 - 5.00	0.205	5.9
	42	5.00 - 10.00	0.223	3.0
	58	10.0 - 20.0	0.24	1.6
	12	20.0 - 50.0	0.18	0.7
	437	Overall	0.15	N/A

OTHER CHECKS:

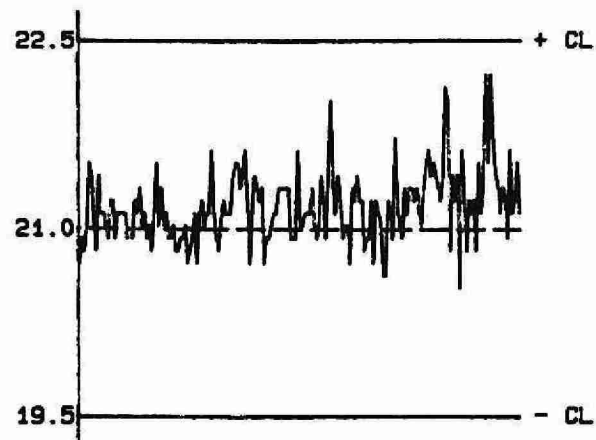
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
Long Term Blank :	183	0.02	0.086

QUALITY CONTROL GRAPHS NITROGEN - AMMONIA PLUS AMMONIUM (MG/L AS N)

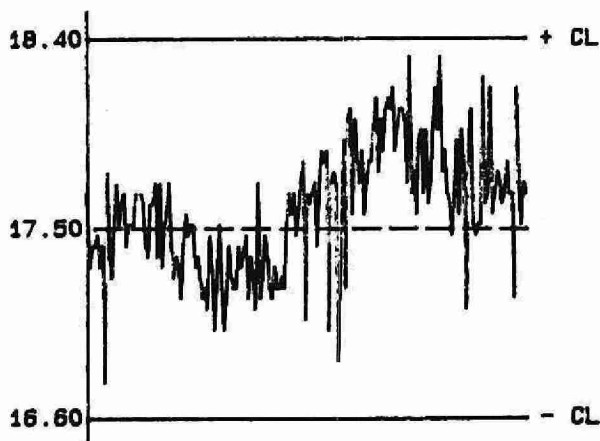
FROM: 06/01/87
TO: 24/12/87



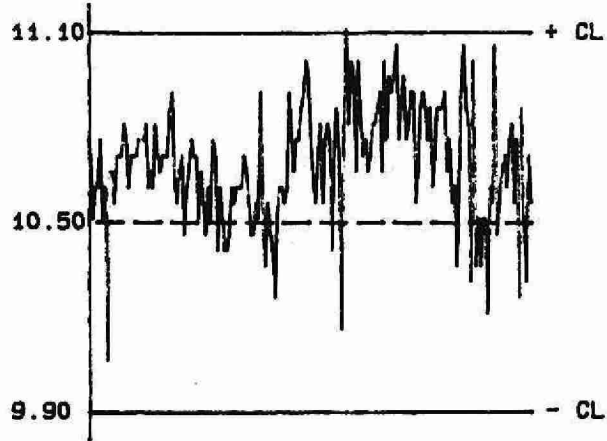
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

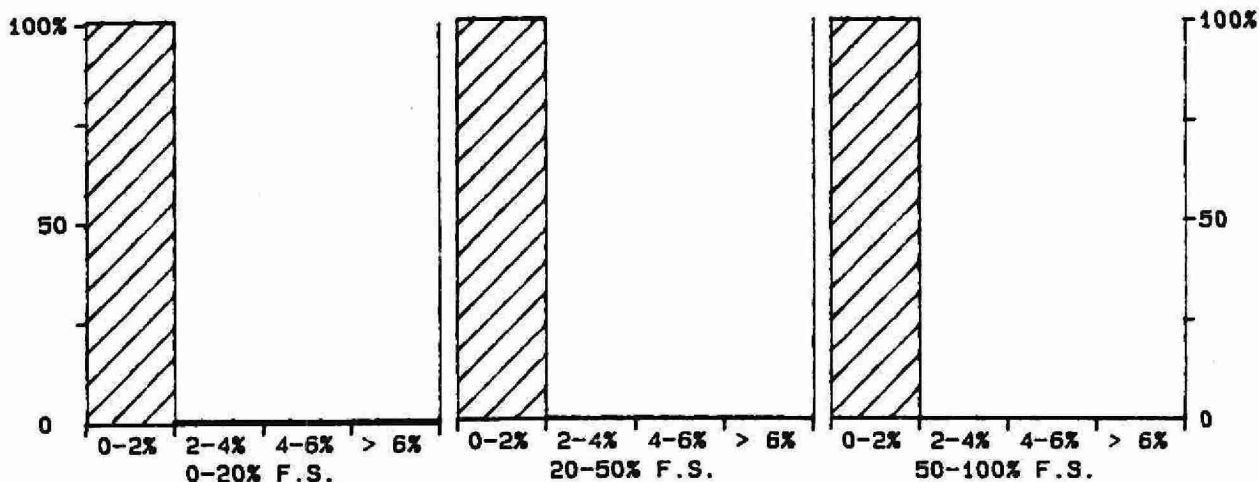


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS N

***** NITROGEN-AMMONIA PLUS AMMONIUM *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: NNHTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 50 mL
Container : PET-500 ml Jars

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance : 0.40 at the full scale level.

N.B. Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3

Current W value: 1

T value: 5

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA
Drift : BL plus 1 standard

NITROGEN - AMMONIA + AMMONIUM
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Dorset

Analytical Range: 5.3 to 1000 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	750	751	1	5.7
b :	46	250	256	6	4.6
a+b :	46	1000	1006	6	8.4
a-b :	46	500	495	-5	6.0
c :	45	75.0	75.6	0.6	2.37
d :	45	25.0	25.1	0.1	1.44
c+d :	45	100.0	100.6	0.6	2.95
c-d :	45	50.0	50.5	0.5	2.59

s.d.(AB): Sw(within run): 4.2 S(between runs): 5.2 S/Sw: 1.22
s.d.(CD): Sw(within run): 1.83 S(between runs): 1.96 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

970 to 1030 for A+B
480 to 520 for A-B
88.0 to 112.0 for C+D
42.0 to 58.0 for C-D

DUPLICATES:

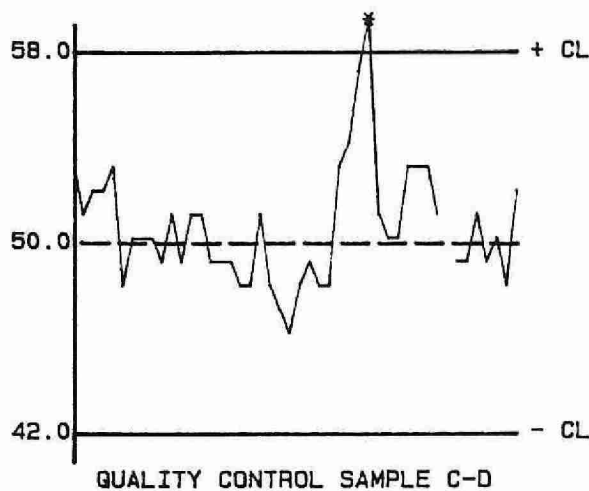
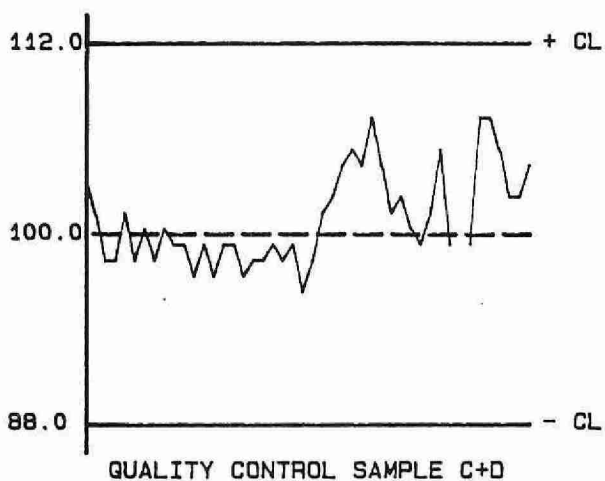
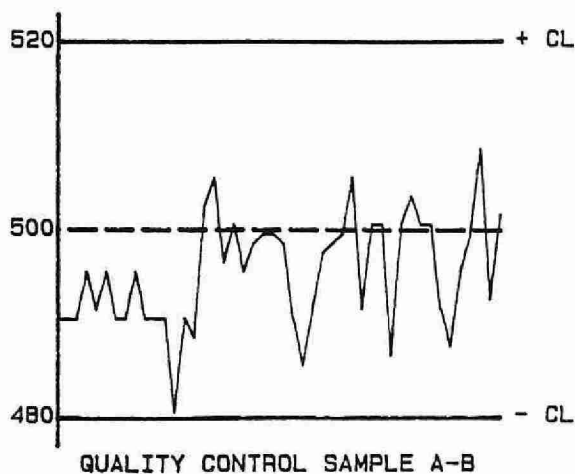
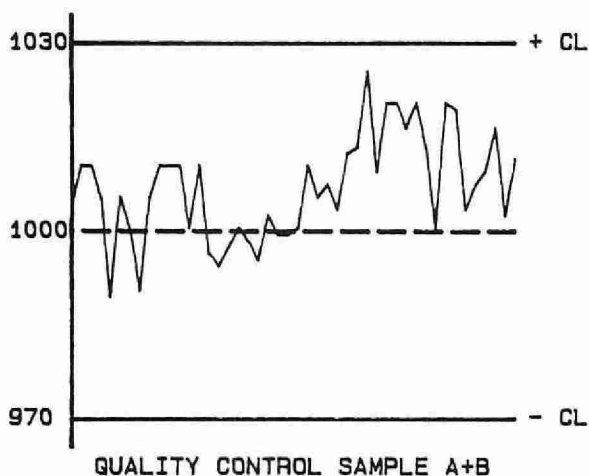
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
86	0.0 - 25.0	1.07	13.6
18	25.0 - 50.0	1.30	3.8
13	50.0 - 100.0	3.00	4.5
17	100 - 500	5.6	2.9
1	500 - 1000	N/A	N/A
135	Overall	2.4	N/A

OTHER CHECKS:

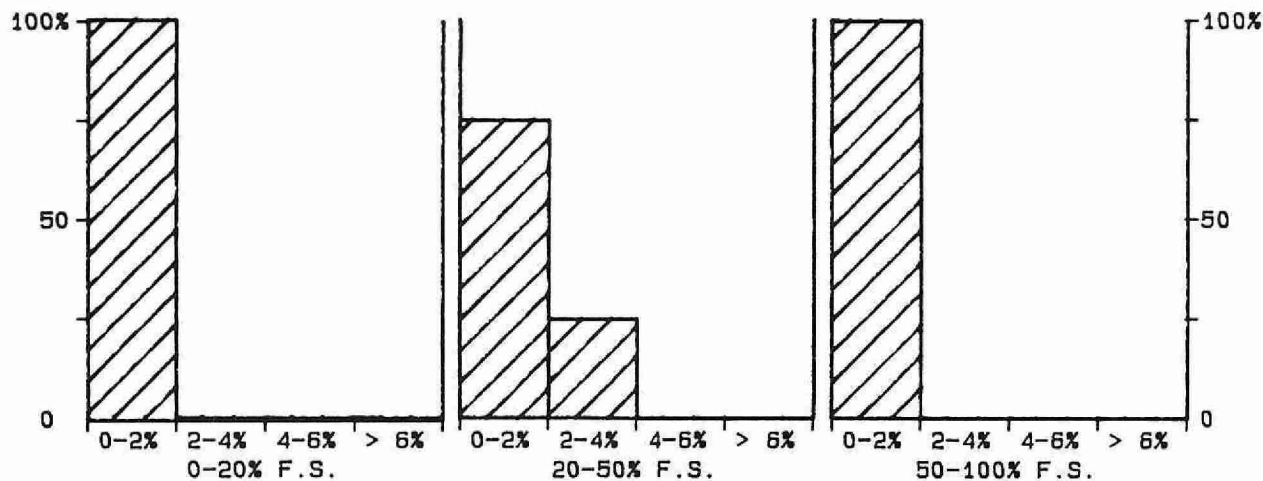
	Number of Data	Data Mean	Standard(1) Deviation
STD. CAL. :	46	77	14.0
Long Term Blank :	45	0.4	0.94

QUALITY CONTROL GRAPHS NITROGEN - AMMONIA + AMMONIUM (UG/L AS N)

FROM: 07/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 UG/L AS N

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/01/84
LIS Test Name Code	: NNHTFR	Units	: ug/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AI0	Supervisor	: F. Tomassini
Sample Type/Matrix	: Teflon filters from sequential filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 25 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on filter extracts via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 1.1 at full scale level.

INSTRUMENTATION:

Basic automated ultrasonic bath modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.125

T value: 0.625

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL plus 3 standards every 10 samples

MODIFICATIONS:

01/05/84 -The procedure introduced on this date is the same as Method A for nitrogen-ammonia in HAMES except that the samples are filter extracts and the full scale concentration is 125 ug/filer as N.

PRECIPITATION AMMONIA
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 0.025 to 5.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	65	4.00	3.99	-0.01	0.033
b :	65	0.80	0.80	0.00	0.021
a+b :	65	4.80	4.80	-0.00	0.045
a-b :	65	3.20	3.19	-0.01	0.033
c :	65	0.800	0.797	-0.003	0.0091
d :	65	0.200	0.192	-0.008	0.0074
c+d :	65	1.000	0.989	-0.011	0.0129
c-d :	65	0.600	0.605	0.005	0.0103

s.d.(AB): Sw(within run): 0.023 S(between runs): 0.028 S/Sw: 1.19
s.d.(CD): Sw(within run): 0.0073 S(between runs): 0.0083 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.57 to 5.02 for A+B
3.05 to 3.35 for A-B
0.850 to 1.150 for C+D
0.500 to 0.700 for C-D

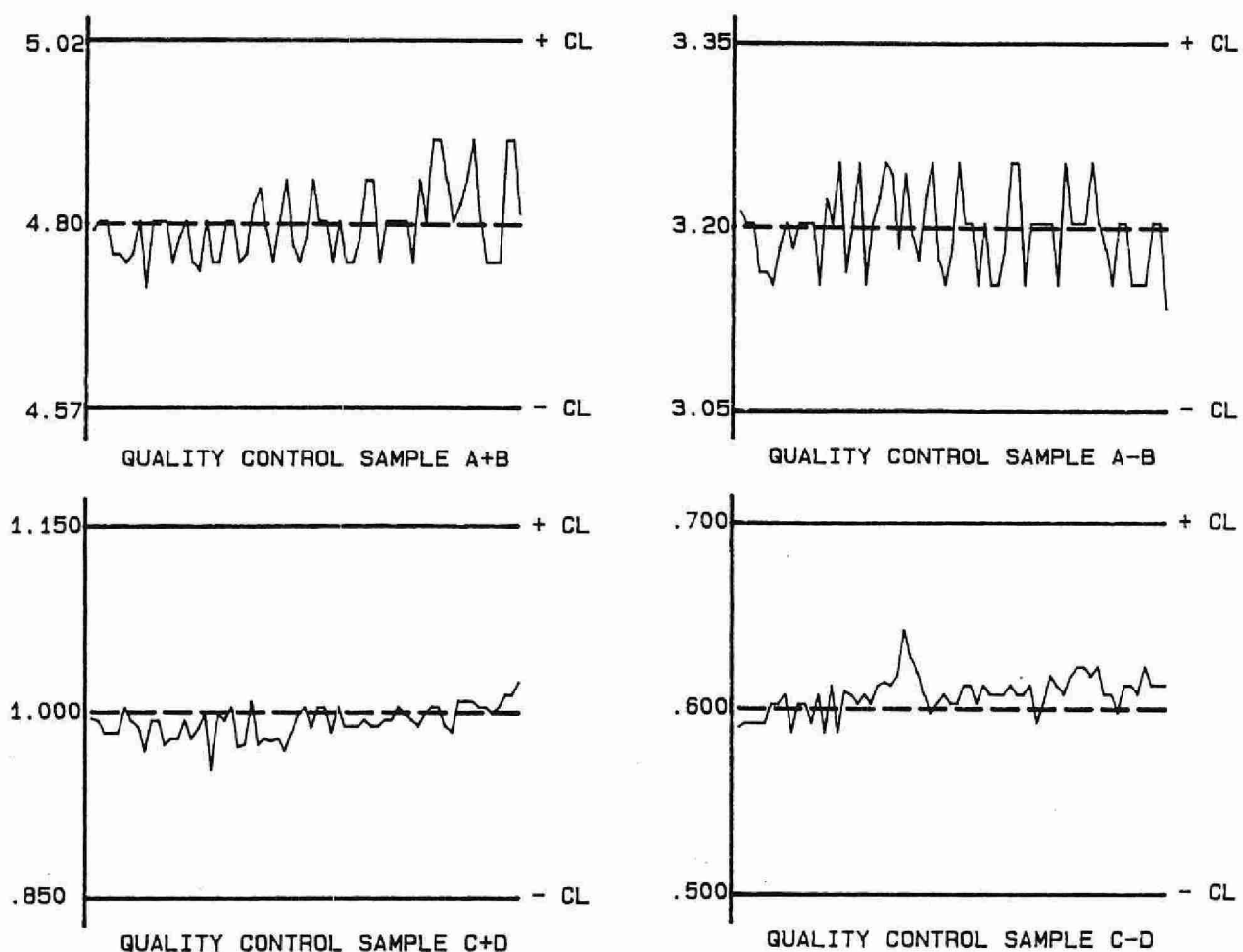
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	42	0.000 - 0.200	0.005	5.4
	49	0.200 - 0.500	0.0103	3.0
	39	0.500 - 1.000	0.1126	16.3
	34	1.00 - 2.50	0.009	0.7
	5	2.50 - 5.00	0.032	0.9
	169	Overall	0.055	N/A

OTHER CHECKS:

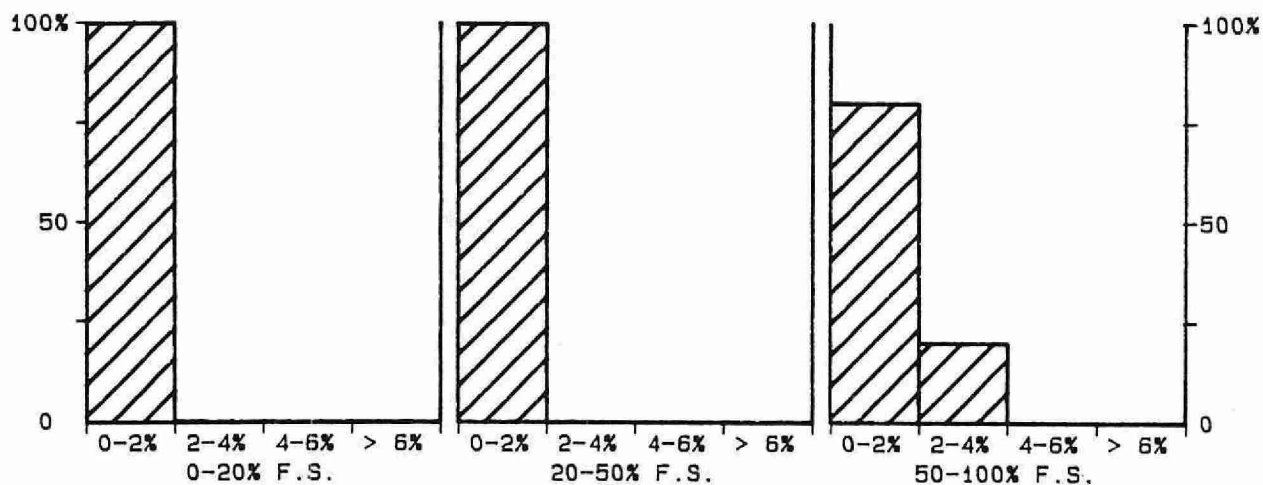
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	64	0.958	0.2120

QUALITY CONTROL GRAPHS PRECIPITATION AMMONIA (MG/L AS N)

FROM: 07/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS N

***** NITROGEN - NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3FR,NNRICF	Units	: ug/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AIO	Supervisor	: F. Tomassini
Sample Type/Matrix	: Teflon and nylon filters from sequential filter packs and nylon filters from LoVol filter packs.		

SAMPLING:

Quantity Required : 1 filter
Container : 50 ml Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as N.

Full scale conductivity: 30 uS/cm.

N.B. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of Teflon and nylon filter extracts by developing the above filter extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ was introduced.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN - NITRATE
QUALITY CONTROL DATA FROM 14/01/87 TO 22/12/87

Lab: Ion Chromatography

Analytical Range: 1.06 to 50.0 ug/Filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	40.0	40.1	0.1	0.35
b :	46	10.0	9.9	-0.1	0.32
a+b :	46	50.0	50.0	0.0	0.44
a-b :	46	30.0	30.2	0.2	0.51

s.d.(AB): Sw(within run): 0.36 S(between runs): 0.34 S/Sw: 0.93

On any given day the calibration is accepted if the values obtained lie within the ranges:

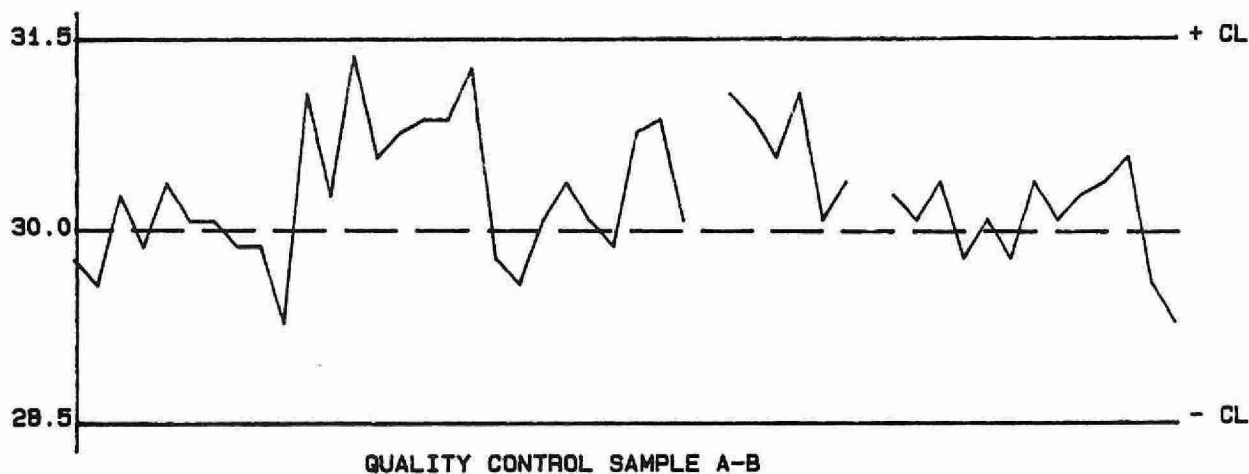
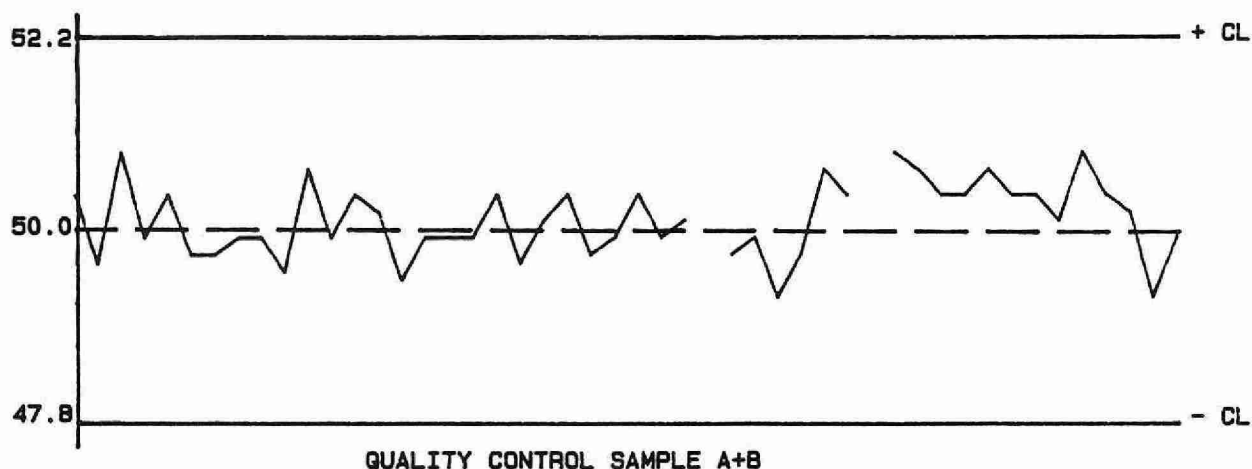
47.8 to 52.2 for A+B
 28.5 to 31.5 for A-B

DUPLICATES:

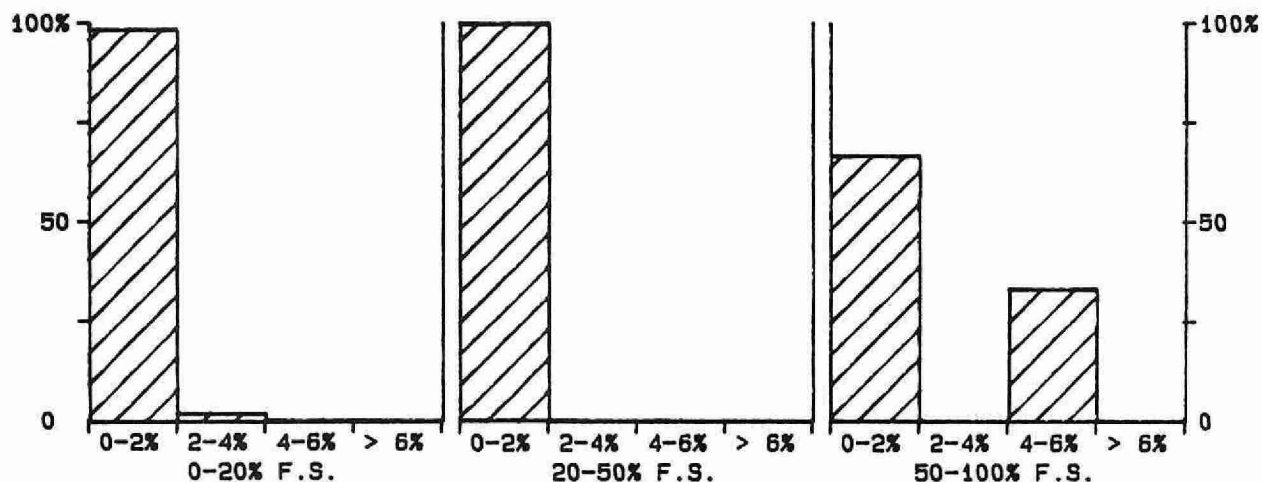
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
51	0.00 - 5.00	0.213	13.0
9	5.0 - 10.0	0.44	6.2
12	10.0 - 25.0	0.28	1.7
1	25.0 - 50.0	N/A	N/A
73	Overall	0.26	N/A

QUALITY CONTROL GRAPHS NITROGEN - NITRATE (UG/FILTER AS N)

FROM: 14/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/FILTER AS N

***** NITROGEN - NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO3UR	Units	: mg/L as N
Work Station Code	: PRIC1	Unit Code	: 064807
Method Code	: 003AI0	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Polystyrene bottle

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample scan to a series of standard scans.

Full scale conductivity: 10 uS/cm.

N.B. Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3

Current W value: 0.01

T value: 0.05

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA

Drift : 1 standard every 10 samples

MODIFICATIONS:

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.

NITROGEN-NITRATE
QUALITY CONTROL DATA FROM 06/01/87 TO 30/12/87

Lab: Ion Chromatography

Analytical Range: 0.02 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	80	1.60	1.61	0.01	0.019
b :	80	0.40	0.40	-0.00	0.014
a+b :	80	2.00	2.00	0.00	0.026
a-b :	80	1.20	1.21	0.01	0.021

s.d.(AB): Sw(within run): 0.015 S(between runs): 0.017 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

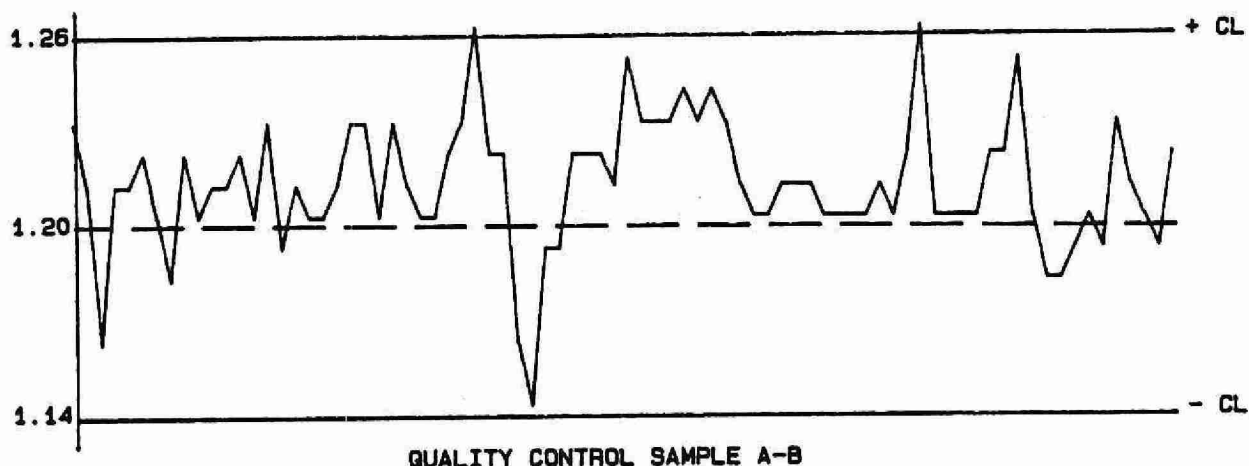
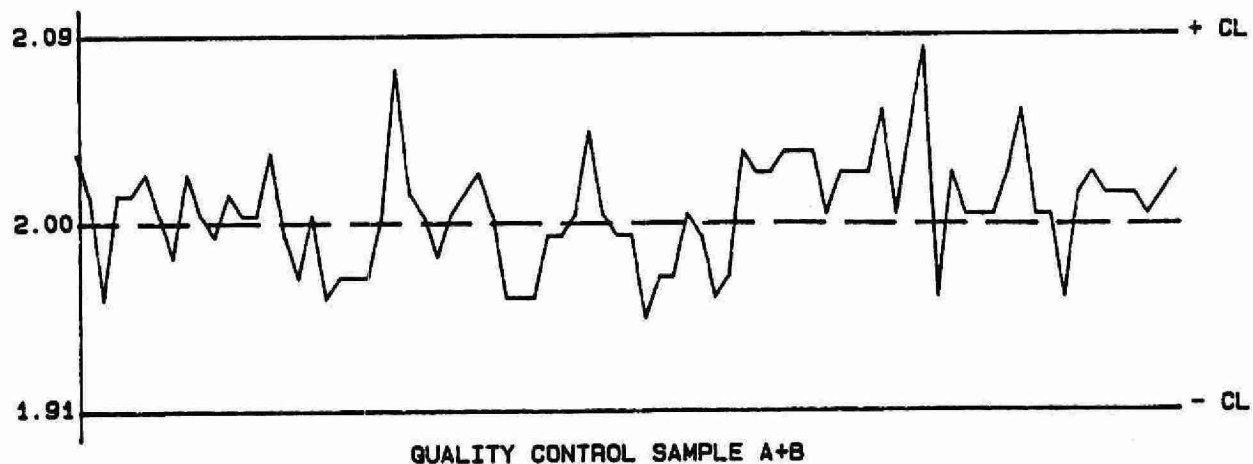
1.91 to 2.09 for A+B
1.14 to 1.26 for A-B

DUPLICATES:

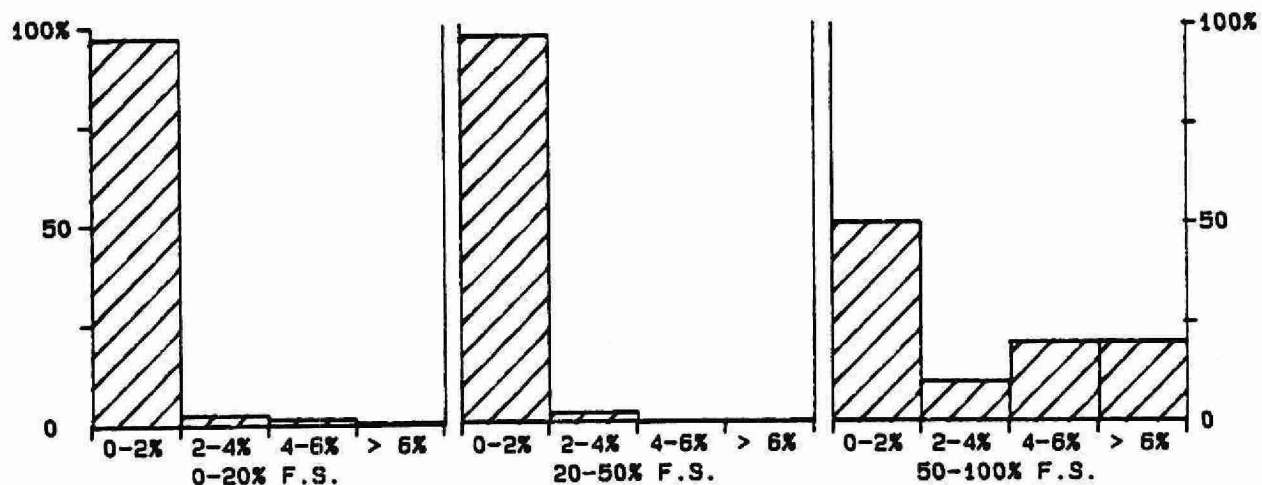
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
65	0.00 - 0.20	0.005	7.4
41	0.20 - 0.50	0.014	4.3
29	0.50 - 1.00	0.009	1.3
8	1.00 - 2.00	0.071	4.6
143	Overall	0.019	N/A

QUALITY CONTROL GRAPHS NITROGEN-NITRATE (MG/L AS N)

FROM: 06/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** NITROGEN - NITRATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3UR	Units	: ug/Filter as N
Work Station Code	: PRLOV	Unit Code	: 361807
Method Code	: 004AIC	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as N.

Full scale conductivity: 30 uS/cm.

N.B. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/08/81 -Ion chromatographic procedure for precipitation samples was modified for analysis of LoVol W40 filter extracts by developing the above filter extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with $\text{Na}_2\text{CO}_3/\text{NaHCO}_3$ was introduced.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

NITROGEN - NITRATE
QUALITY CONTROL DATA FROM 02/01/87 TO 22/12/87

Lab: Ion Chromatography

Analytical Range: 0.9 to 100.0 ug/Filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	23	80.0	80.0	0.0	0.66
b :	23	20.0	19.9	-0.1	0.62
a+b :	23	100.0	99.9	-0.1	0.93
a-b :	23	60.0	60.2	0.2	0.87

s.d.(AB): Sw(within run): 0.62 S(between runs): 0.64 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.5 to 104.5 for A+B
 57.0 to 63.0 for A-B

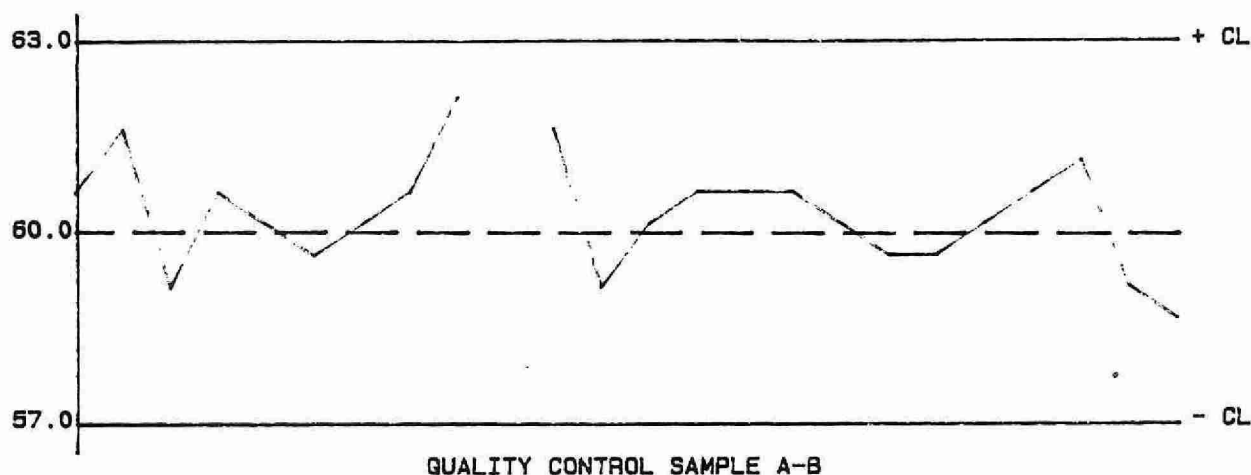
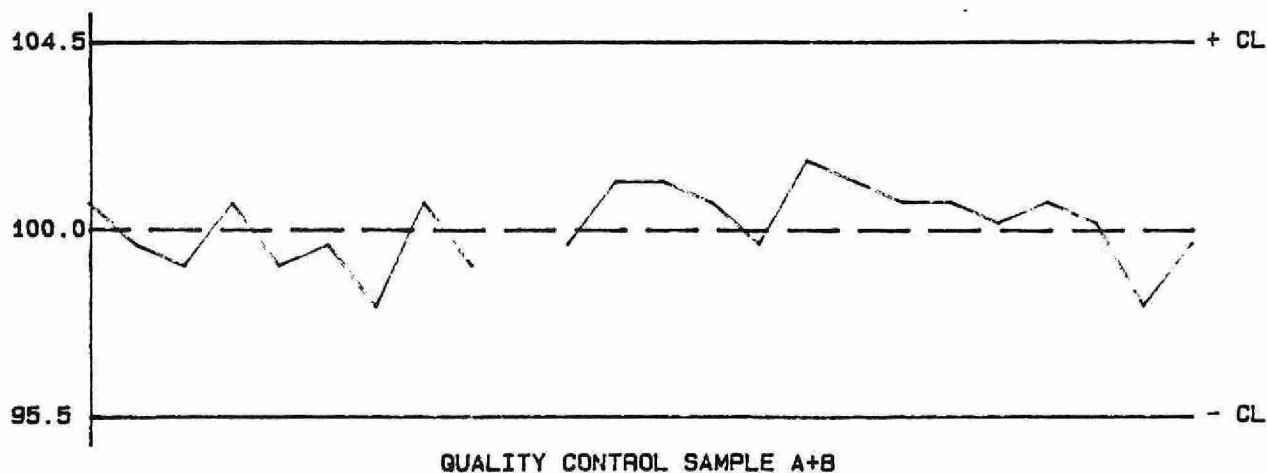
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
16	0.0 - 10.0	0.18	7.4
10	10.0 - 25.0	0.27	1.7
2	25.0 - 50.0	0.29	0.9
4	50.0 - 100.0	1.39	1.8
32	Overall	0.54	N/A

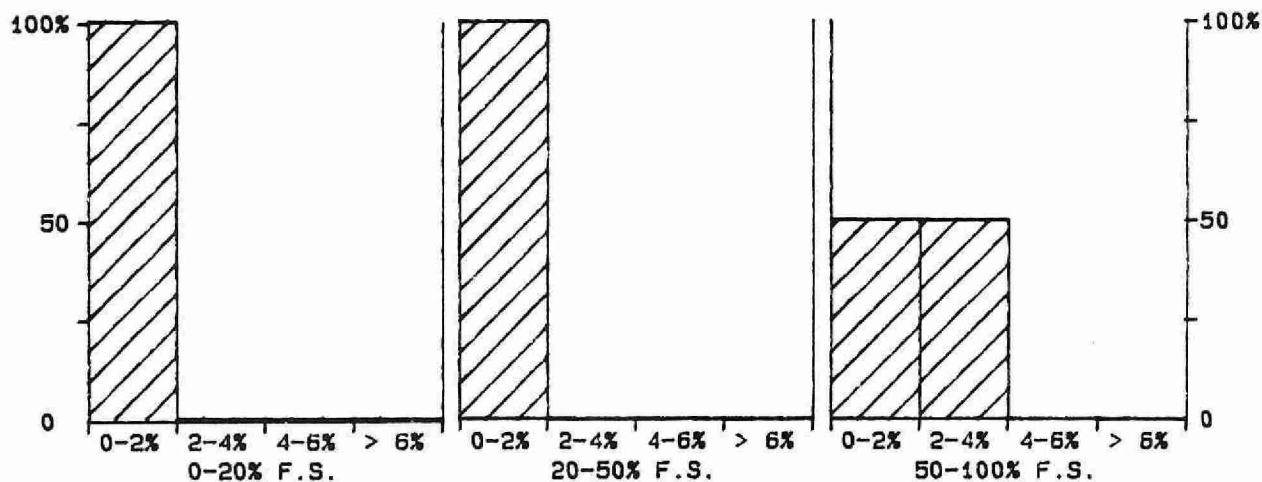
QUALITY CONTROL GRAPHS NITROGEN - NITRATE (UG/FILTER AS N)

FROM: 02/01/87

TO: 22/12/87



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/FILTER AS N

*****NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.6 at the full scale level.

N.B. Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).

15/05/84 -Commodore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN-NITRATE PLUS NITRITE
QUALITY CONTROL DATA FROM 06/01/87 TO 22/12/87

Lab: Colourimetry

Analytical Range: 0.04 to 5.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	153	4.00	4.00	0.00	0.044
b :	153	1.00	1.00	-0.00	0.014
a+b :	153	5.00	5.00	-0.00	0.046
a-b :	153	3.00	3.00	0.00	0.047
c :	153	1.00	1.00	-0.00	0.014
d :	153	0.50	0.49	-0.01	0.011
c+d :	153	1.50	1.49	-0.01	0.022
c-d :	153	0.50	0.50	0.00	0.013

s.d.(AB): Sw(within run): 0.033 S(between runs): 0.033 S/Sw: 0.98
s.d.(CD): Sw(within run): 0.009 S(between runs): 0.013 S/Sw: 1.37

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.77 to 5.23 for A+B
2.85 to 3.15 for A-B
1.45 to 1.55 for C+D
0.47 to 0.53 for C-D

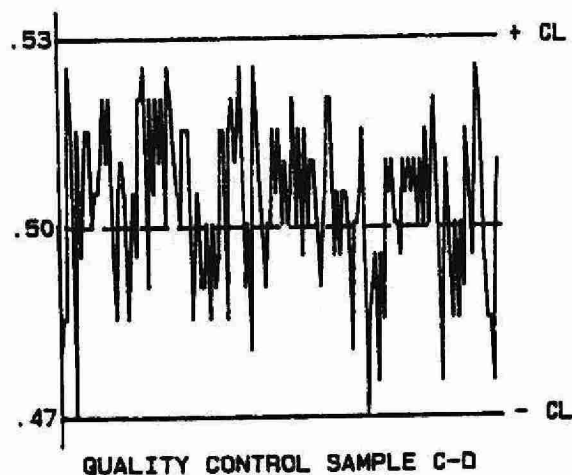
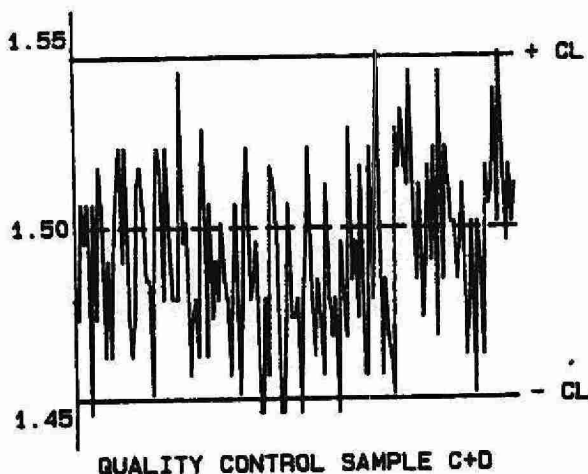
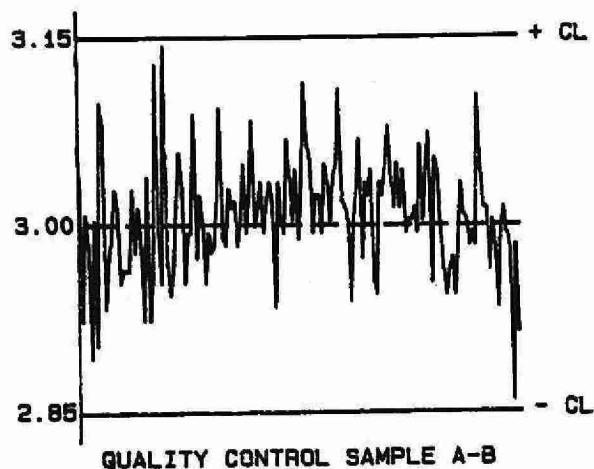
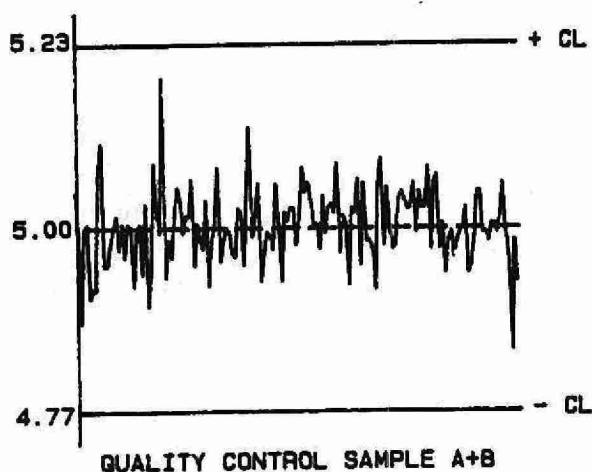
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	167	0.00 - 0.20	0.009	11.1
	98	0.20 - 0.50	0.032	9.9
	55	0.50 - 1.00	0.284	40.5
	60	1.00 - 2.50	0.036	2.1
	46	2.50 - 5.00	0.060	1.6
	426	Overall	0.106	N/A

OTHER CHECKS:

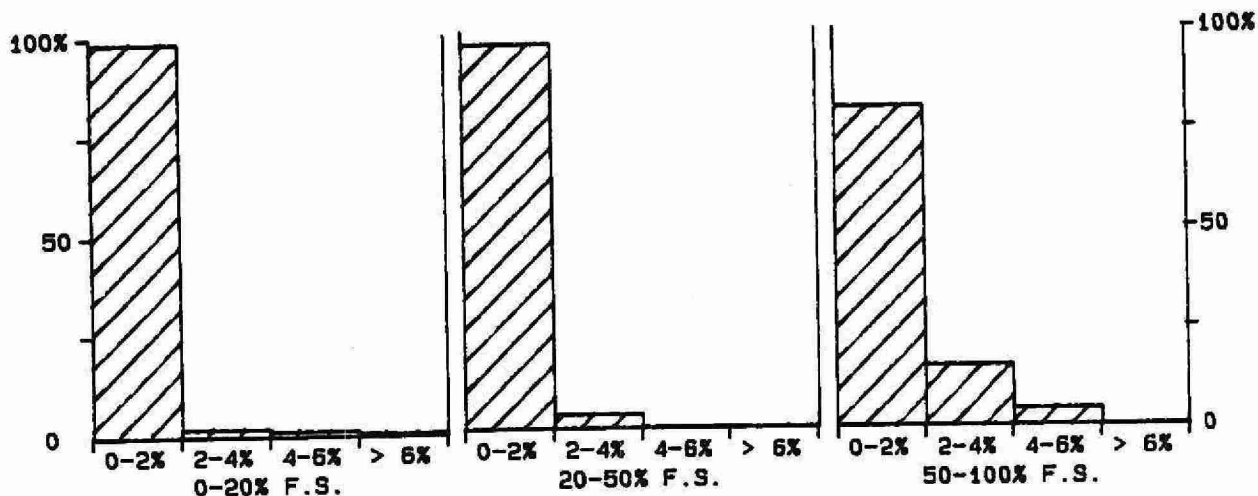
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	113	0.38	0.488

QUALITY CONTROL GRAPHS NITROGEN-NITRATE PLUS NITRITE (MG/L AS N)

FROM: 06/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS N

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.7 at the full scale level.

N.B. Ammonia plus ammonium, nitrite, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standards every 20 samples
Interference : Nitrite standard (nitrate and nitrite at same concentration run separately: zero difference is expected) confirms effective operation of reduction step. Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression by sample dilution.

MODIFICATIONS:

01/06/85 -Ion exchange column was removed and replaced by increasing in-line sample dilution to the point that the interference check showed control could be retained and no loss in performance was observed.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NITROGEN - NITRATE PLUS NITRITE
QUALITY CONTROL DATA FROM 06/01/87 TO 24/12/87

Lab: Colourimetry

Analytical Range: 0.51 to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	185	35.0	35.3	0.3	0.47
b :	185	15.4	15.5	0.1	0.25
a+b :	185	50.4	50.9	0.5	0.66
a-b :	185	19.6	19.8	0.2	0.38
c :	185	15.40	15.54	0.14	0.251
d :	185	4.20	4.18	-0.02	0.117
c+d :	185	19.60	19.72	0.12	0.324
c-d :	185	11.20	11.36	0.16	0.219

s.d.(AB): Sw(within run): 0.27 S(between runs): 0.38 S/Sw: 1.40
s.d.(CD): Sw(within run): 0.155 S(between runs): 0.196 S/Sw: 1.26

On any given day the calibration is accepted if the values obtained lie within the ranges:

48.1 to 52.6 for A+B
18.1 to 21.1 for A-B
18.70 to 20.50 for C+D
10.60 to 11.80 for C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
326	0.00 - 2.00	0.101	24.9
58	2.00 - 5.00	0.259	7.8
50	5.00 - 10.00	0.270	3.7
51	10.0 - 20.0	0.27	1.8
19	20.0 - 50.0	0.48	1.7
504	Overall	0.19	N/A

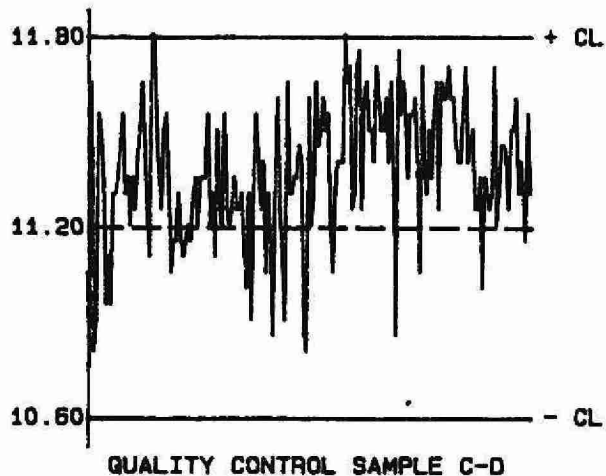
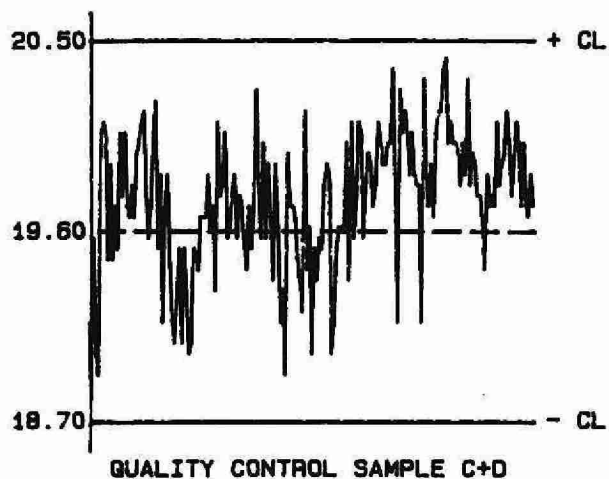
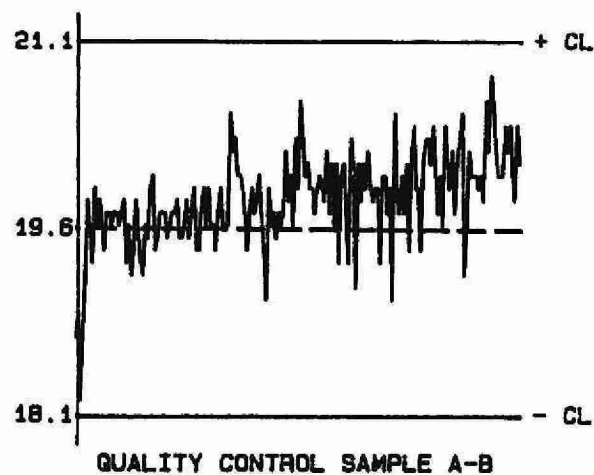
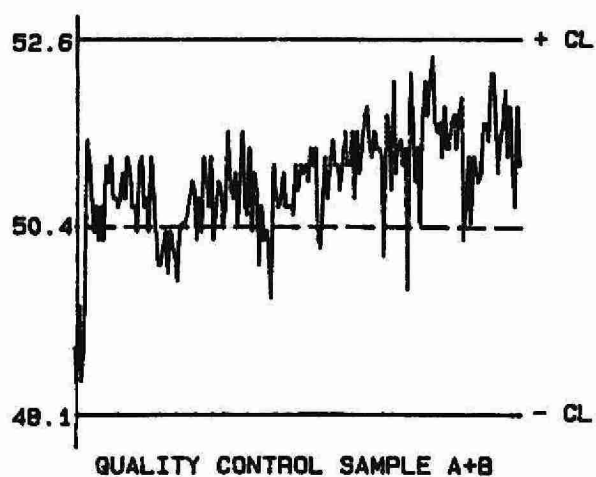
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
NO3-NO2 :	0	N/A	N/A
NO3-Ca/Mg :	0	N/A	N/A
Long Term Blank :	94	0.06	0.045

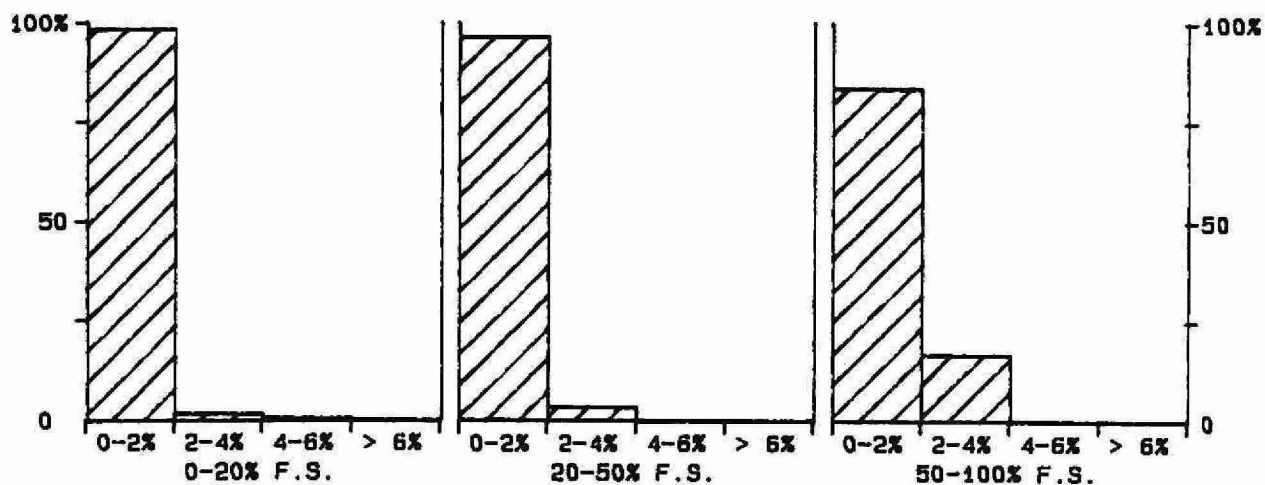
QUALITY CONTROL GRAPHS NITROGEN - NITRATE PLUS NITRITE (MG/L AS N)

FROM: 06/01/87

TO: 24/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/76
LIS Test Name Code	: NNOTUR	Units	: mg/L as N
Work Station Code	: WFNO3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Ministry of Health Water Samples		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.1	T value: 0.5
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CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; BL plus standards every 20 samples

NITROGEN-NITRATE+NITRITE
QUALITY CONTROL DATA FROM 09/01/87 TO 17/12/87

Lab: Colourimetry

Analytical Range: 0.5 to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	57	15.0	14.9	-0.1	0.26
b :	57	3.0	2.9	-0.1	0.11
a+b :	57	18.0	17.8	-0.2	0.29
a-b :	57	12.0	11.9	-0.1	0.27

s.d.(AB): Sw(within run): 0.19 S(between runs): 0.20 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

16.5 to 19.5 for A+B
 11.0 to 13.0 for A-B

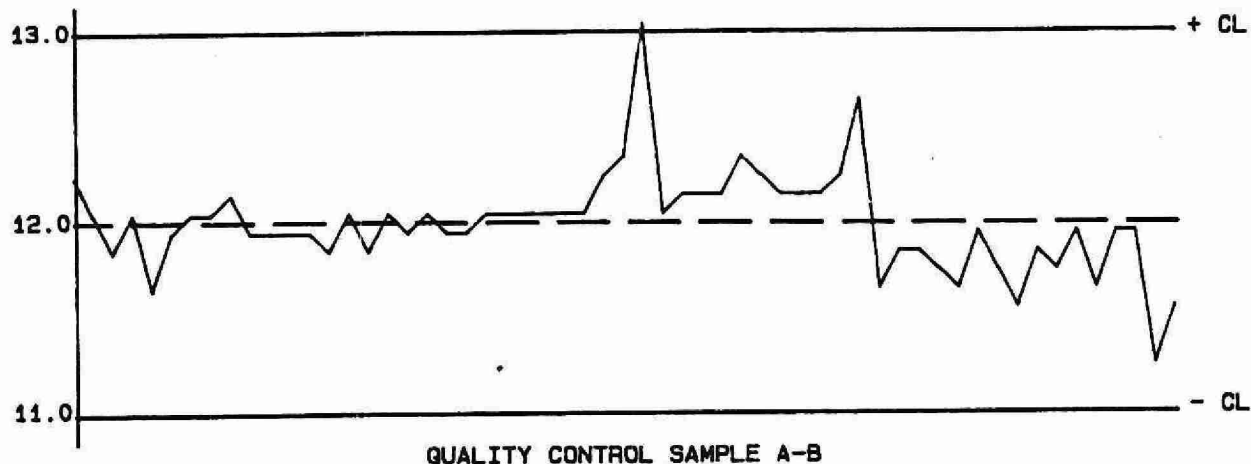
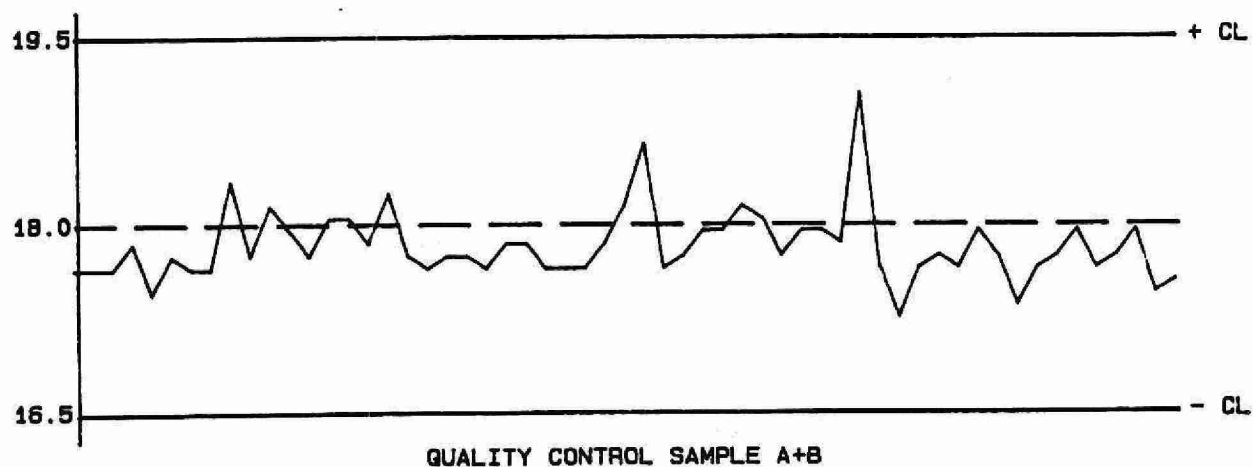
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
77	0.0 - 2.0	0.10	21.9
22	2.0 - 5.0	0.17	5.1
14	5.0 - 10.0	0.10	1.4
19	10.0 - 20.0	0.16	1.1
132	Overall	0.13	N/A

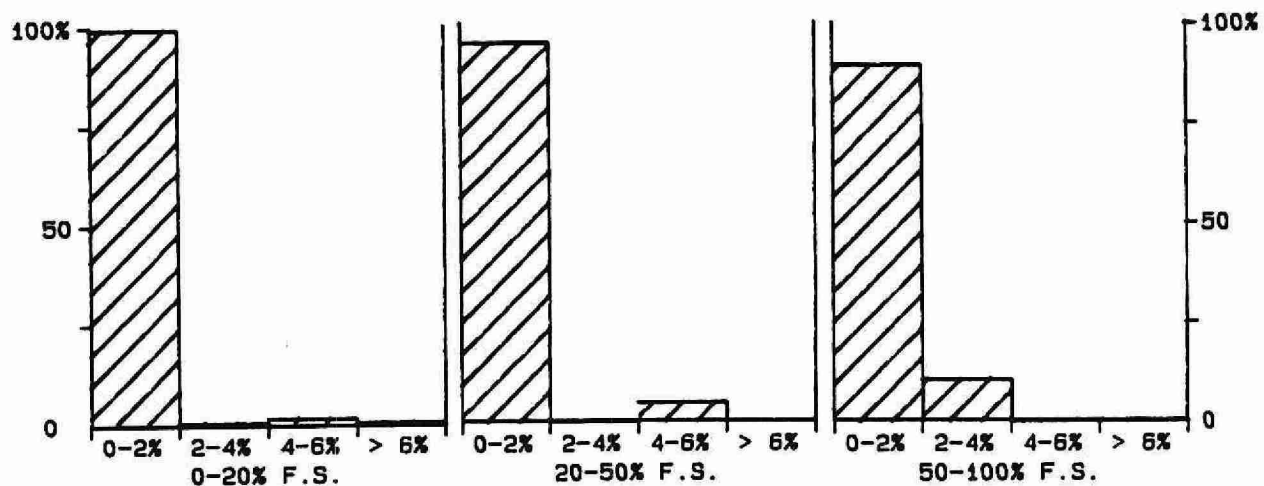
QUALITY CONTROL GRAPHS NITROGEN-NITRATE+NITRITE (MG/L AS N)

FROM: 09/01/87

TO: 17/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS N

***** NITROGEN - NITRATE PLUS NITRITE *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 13/06/78
LIS Test Name Code	: NNOTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 50 mL
Container : PET-500 ml Jars

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl)ethylenediaminedihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance : 0.4 at the full scale level.

N.B. Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules:

37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : LTBL plus 4 standards, e.g. QCA
Drift : BL plus 1 standard every 10 samples

NITRITE + NITRATE
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Dorset

Analytical Range: 9 to 500 ug/l as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	50	375	376	1	3.9
b :	50	125	127	2	4.5
a+b :	50	500	503	3	5.9
a-b :	50	250	249	-1	5.9

s.d.(AB): Sw(within run): 4.2 S(between runs): 4.2 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

470 to 530 for A+B
 230 to 270 for A-B

DUPLICATES:

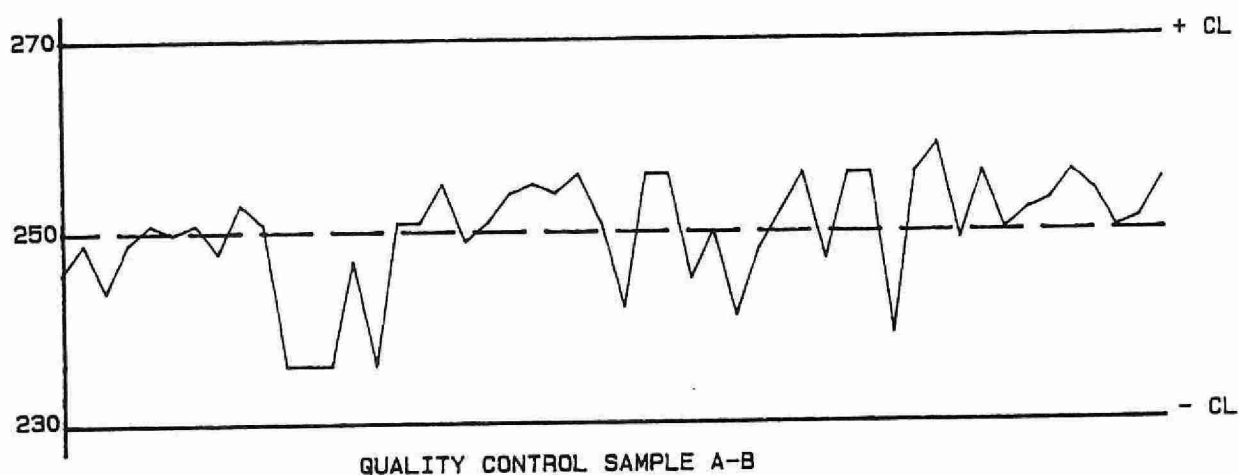
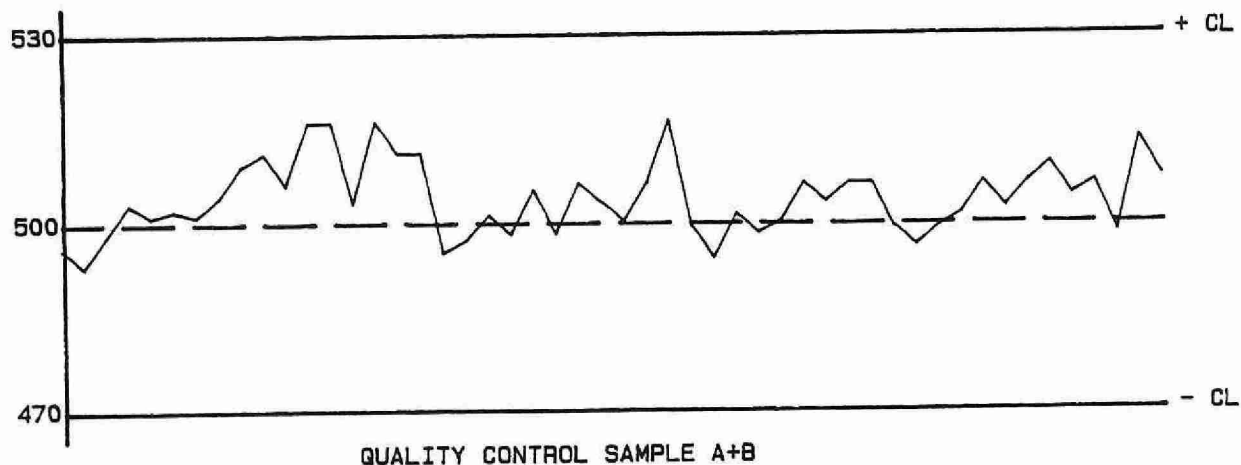
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
61	0 - 50	1.8	10.2
21	50 - 100	2.7	3.6
41	100 - 250	4.1	2.8
14	250 - 500	5.6	1.8
137	Overall	3.3	N/A

OTHER CHECKS:

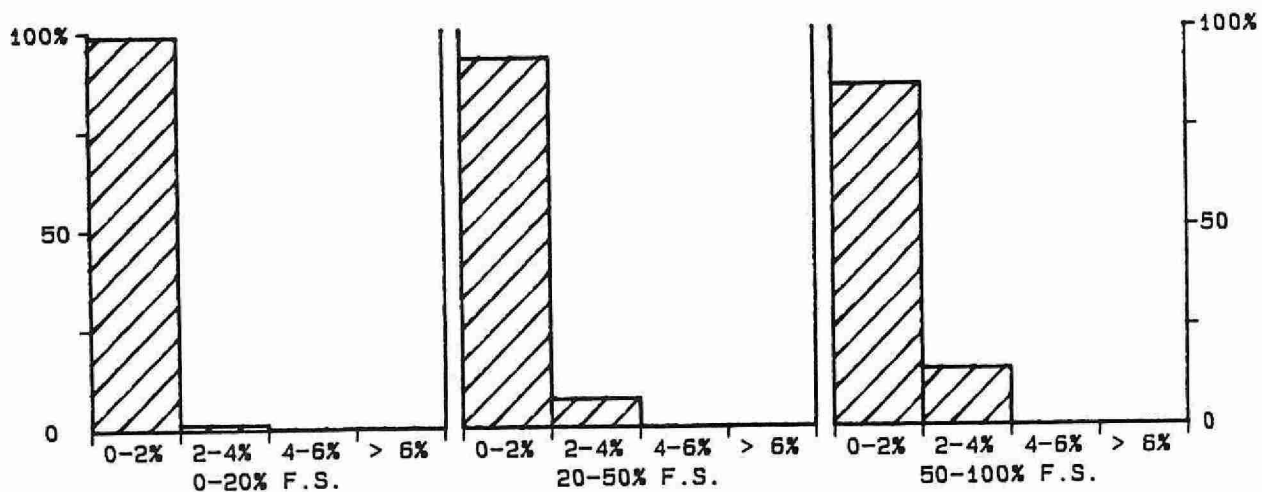
	Number of Data	Data Mean	Standard(1) Deviation
std. cal.	50	155.7	27.3
Long Term Blank	50	0.4	0.9

QUALITY CONTROL GRAPHS NITRITE + NITRATE (UG/L AS N)

FROM: 07/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



***** NITROGEN - NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extratcts, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.
Approximate absorbance: 0.6 at the full scale level.
N.B. Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).
15/05/84 -Microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.
01/110/84 -Sample filtration was eliminated for Great Lakes (G) samples.
12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN-NITRITE
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: N/A to 0.250 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	154	0.200	0.195	-0.005	0.0026
b :	154	0.050	0.049	-0.001	0.0011
a+b :	154	0.250	0.244	-0.006	0.0032
a-b :	154	0.150	0.147	-0.003	0.0025
c :	154	0.050	0.049	-0.001	0.0011
d :	154	0.025	0.025	0.000	0.0012
c+d :	154	0.075	0.074	-0.001	0.002
c-d :	154	0.025	0.024	-0.001	0.0009

s.d.(AB): Sw(within run): 0.0018 S(between runs): 0.002 S/Sw: 1.13
s.d.(CD): Sw(within run): 0.0006 S(between runs): 0.0012 S/Sw: 1.81

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.238 to 0.262 for A+B
0.142 to 0.158 for A-B
0.070 to 0.079 for C+D
0.022 to 0.028 for C-D

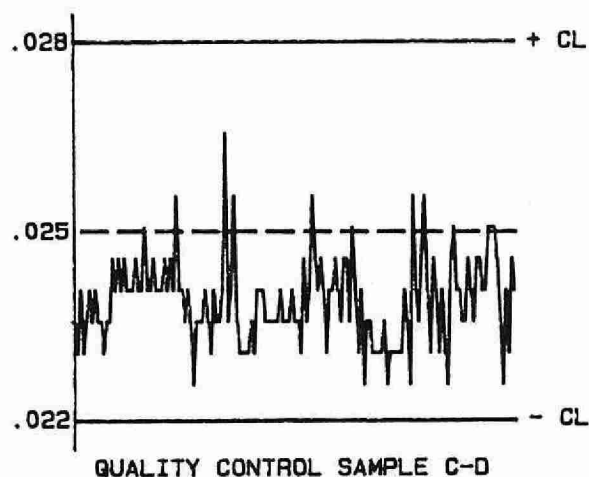
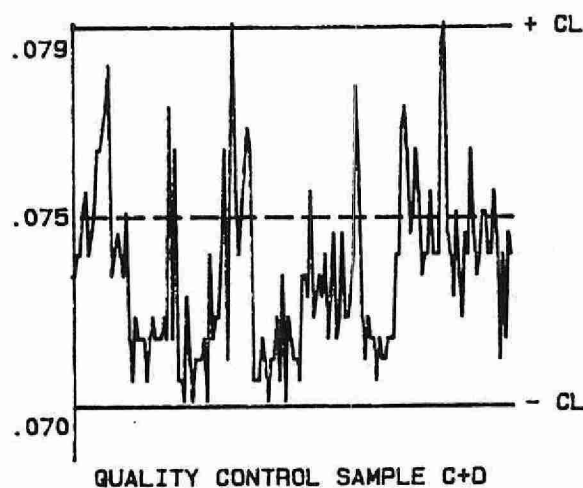
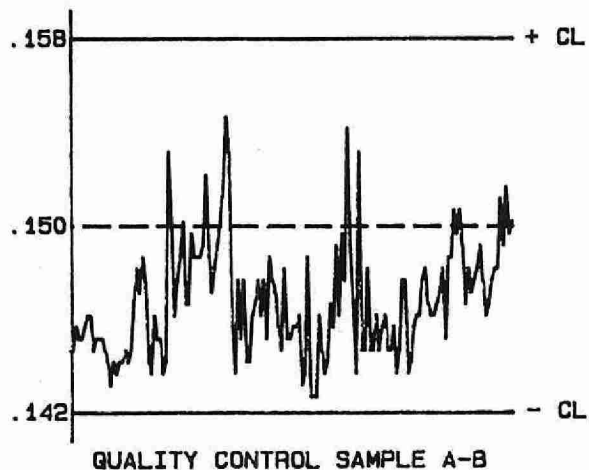
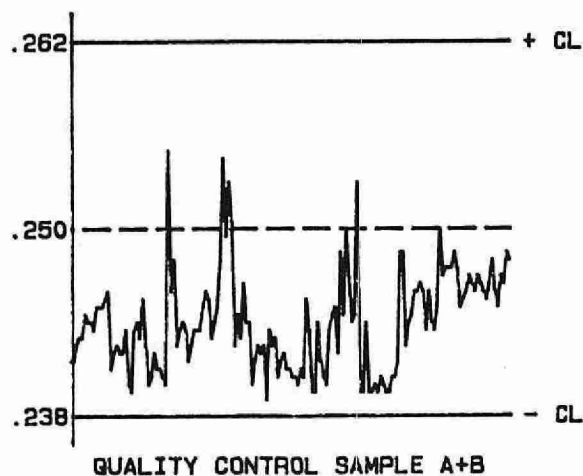
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	0	0.000 - 0.010	N/A	N/A
	71	0.010 - 0.020	0.002	13.8
	75	0.020 - 0.100	0.0023	5.8
	30	0.100 - 0.250	0.0016	0.9
	176	Overall	0.0021	N/A

OTHER CHECKS:

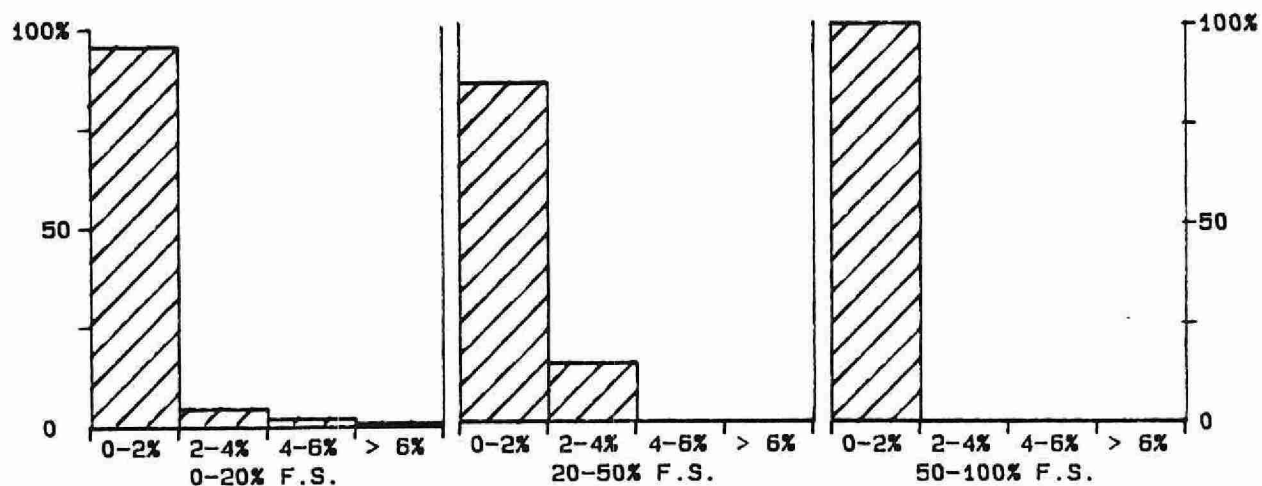
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	118	0.781	0.4168

QUALITY CONTROL GRAPHS NITROGEN-NITRITE (MG/L AS N)

FROM: 06/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .25 MG/L AS N

***** NITROGEN - NITRITE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride.

Approximate absorbance: 0.3 at the full scale level.

N.B. Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NITROGEN - NITRITE
QUALITY CONTROL DATA FROM 07/01/87 TO 24/12/87

Lab: Colourimetry

Analytical Range: 0.050 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	183	1.400	1.401	0.001	0.0270
d :	183	0.700	0.704	0.004	0.0143
c+d :	183	2.100	2.105	0.005	0.0378
c-d :	183	0.700	0.698	-0.002	0.0211

s.d.(CD): Sw(within run): 0.0149
 S/Sw: 1.45

S(between runs): 0.0216

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.010 to 2.190 for C+D
 0.640 to 0.760 for C-D

DUPLICATES:

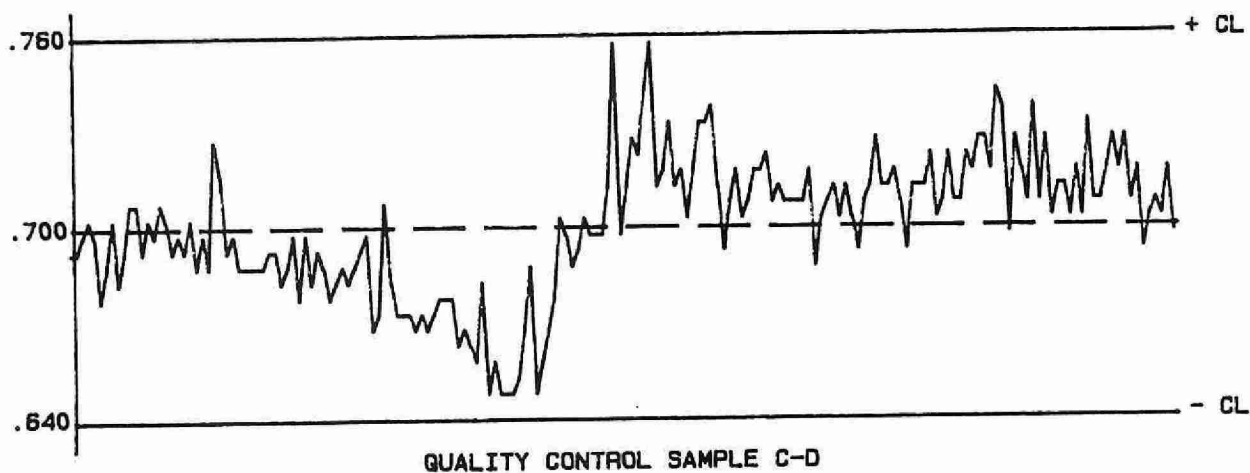
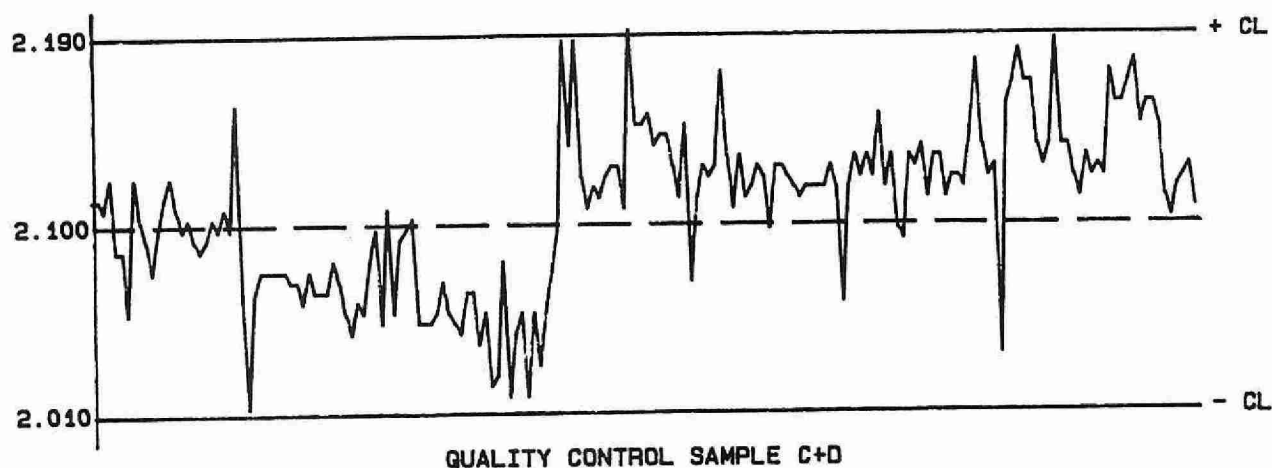
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
246	0.000 - 0.200	0.0100	20.8
202	0.20 - 1.00	0.621	124.7
77	1.00 - 2.00	0.016	1.3
525	Overall	0.385	N/A

OTHER CHECKS:

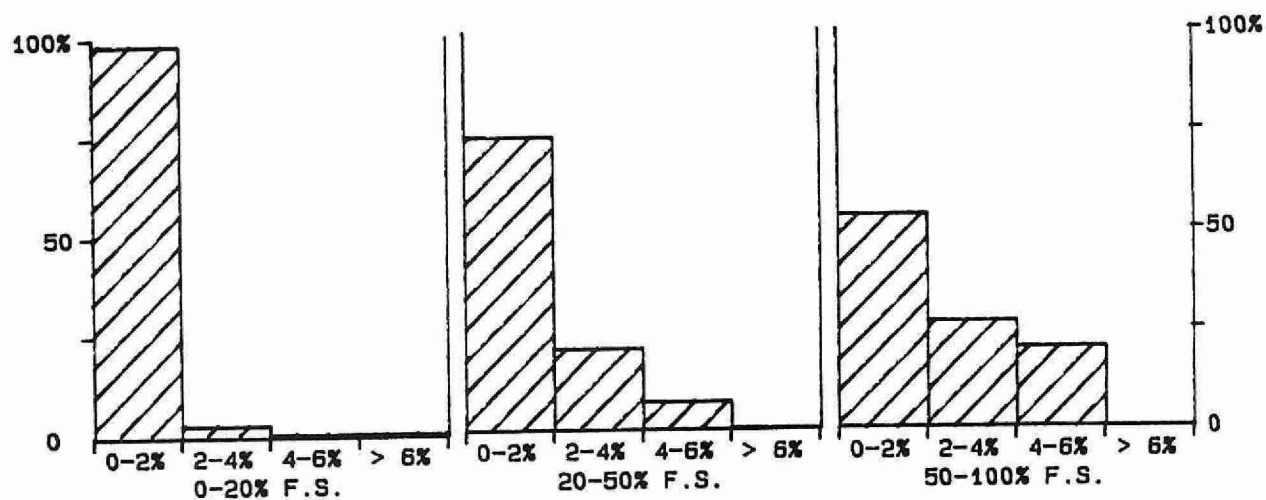
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
Long Term Blank :	166	0.285	0.4542

QUALITY CONTROL GRAPHS NITROGEN - NITRITE (MG/L AS N)

FROM: 07/01/87
TO: 24/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

***** NITROGEN - TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.3 at the full scale level.

N.B. Total phosphorus is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system plus 1 module: 37°C bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm.
- Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.01

CALIBRATION:

BL plus 4 undigested standards

CONTROLS:

Calibration : LTBL plus 2 undigested standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

15/08/83 -Microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic.

26/02/86 -HP9920 microcomputer replace Commodore PET.

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

NITROGEN-TOTAL KJELDAHL
QUALITY CONTROL DATA FROM 06/01/87 TO 24/12/87

Lab: Colourimetry

Analytical Range: 0.10 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	169	1.50	1.49	-0.01	0.080
b :	168	0.50	0.49	-0.01	0.014
a+b :	168	2.00	1.98	-0.02	0.023
a-b :	168	1.00	1.01	0.01	0.020

s.d.(AB): Sw(within run): 0.014 S(between runs): 0.057 S/Sw: 4.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91 to 2.09 for A+B
0.94 to 1.06 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	142	1.40	1.37	0.064
r2 :	150	0.84	0.80	0.054
r3 :	156	0.28	0.27	0.027

DUPLICATES:

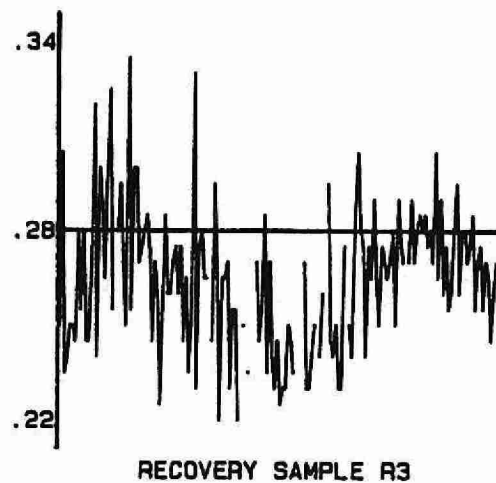
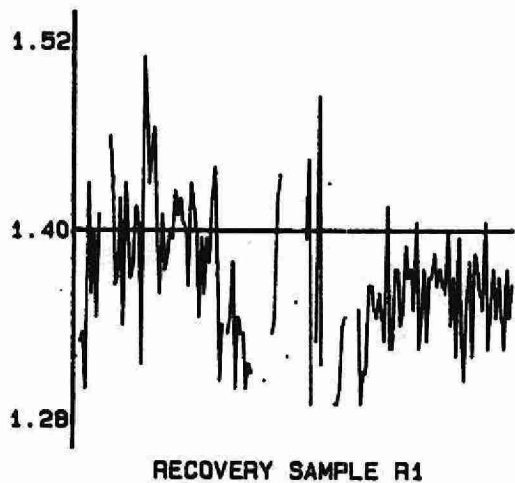
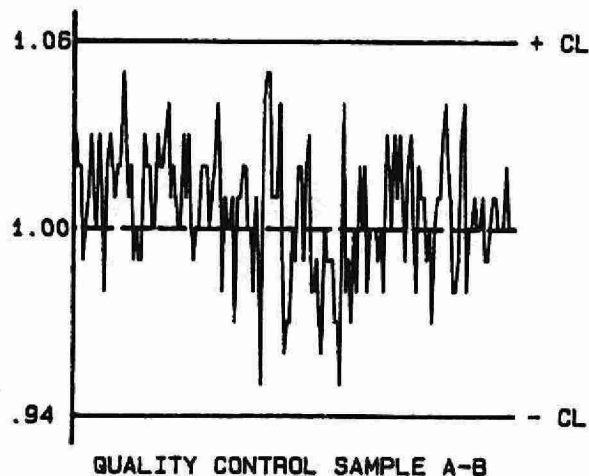
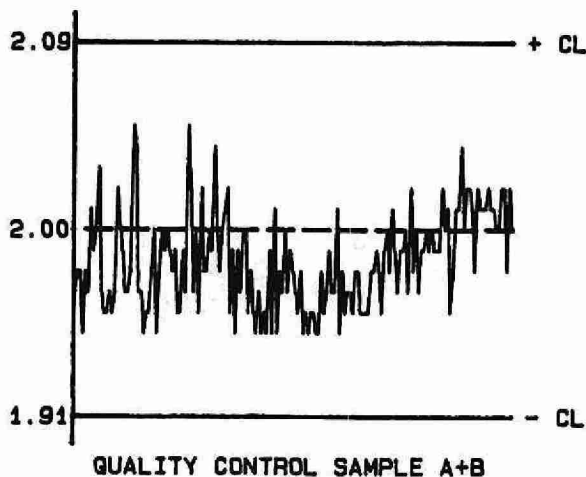
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
92	0.00 - 0.20	0.021	15.6
235	0.20 - 0.50	0.027	8.6
92	0.50 - 1.00	0.028	4.0
23	1.00 - 2.00	0.024	1.7
442	Overall	0.026	N/A

OTHER CHECKS:

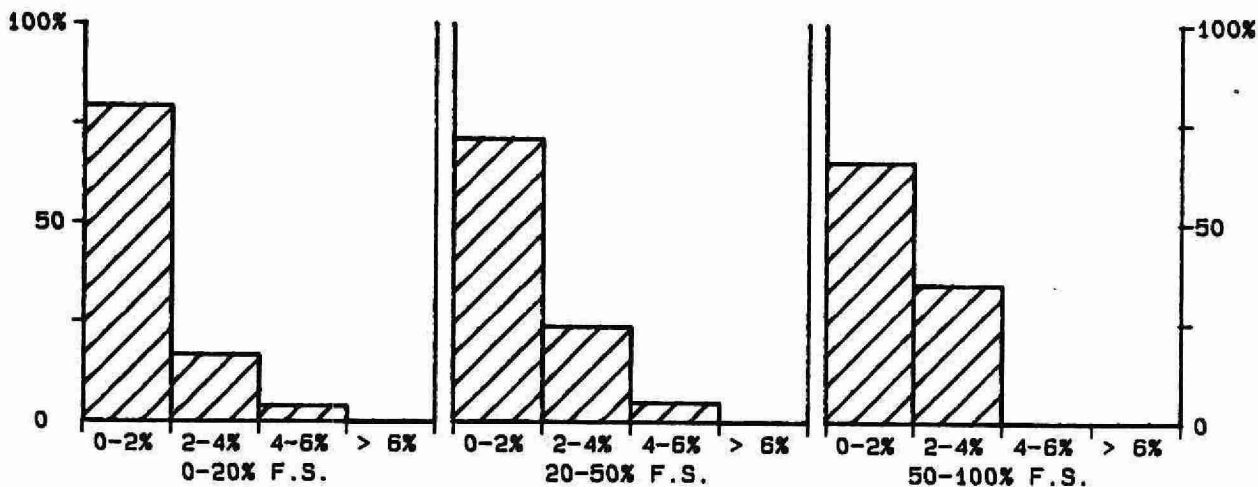
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	159	-0.00	0.009
Digested Blank :	169	0.04	0.107

QUALITY CONTROL GRAPHS NITROGEN-TOTAL KJELDAHL (MG/L AS N)

FROM: 06/01/87
TO: 24/12/87



* DATA > 15% OUTSIDE CL



***** NITROGEN - TOTAL KJELDAHL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: STKNP	Unit Code	: 064807
Method Code	: 004BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Effluents, Leachates		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 1.1 at the full scale level.

N.B. Total phosphorus is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system plus 1 module: 37°C bath (7.7 mL delay). Coulourimetric measurement is through a 1.5 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 6 undigested standards

CONTROLS:

Calibration : LTBL plus 4 undigested standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; BL plus standards every 20 samples

MODIFICATIONS:

01/10/85 -Higher range selected, full scale changed from 10 to 25 mg/L as N. New calibration controls added.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NOTES:

**System is calibrated with undigested standards. Minimum dilution is 50% (i.e. factor of two). Therefore actual W and T values are twice that listed.

NITROGEN - TOTAL KJELDAHL
QUALITY CONTROL DATA FROM 05/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 0.45 to 25.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	164	17.5	17.5	0.0	0.16
b :	164	7.0	6.9	-0.1	0.09
a+b :	164	24.5	24.4	-0.1	0.21
a-b :	164	10.5	10.7	0.2	0.15
c :	164	7.00	6.88	-0.12	0.085
d :	164	1.40	1.38	-0.02	0.037
c+d :	164	8.40	8.26	-0.14	0.109
c-d :	164	5.60	5.50	-0.10	0.072

s.d.(AB): Sw(within run): 0.11 S(between runs): 0.13 S/Sw: 1.22
s.d.(CD): Sw(within run): 0.051 S(between runs): 0.066 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.4 to 25.6 for A+B
9.8 to 11.2 for A-B
7.95 to 8.85 for C+D
5.30 to 5.90 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	160	17.5	17.4	0.31
r2 :	160	7.00	6.80	0.160
r3 :	152	3.50	3.33	0.083

DUPLICATES:

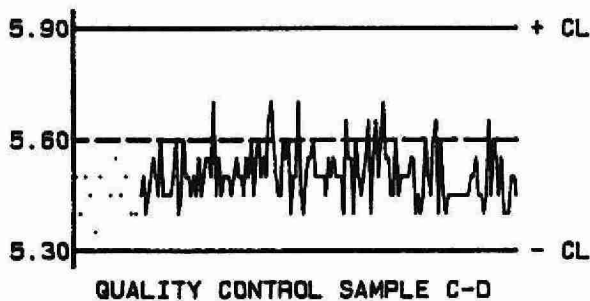
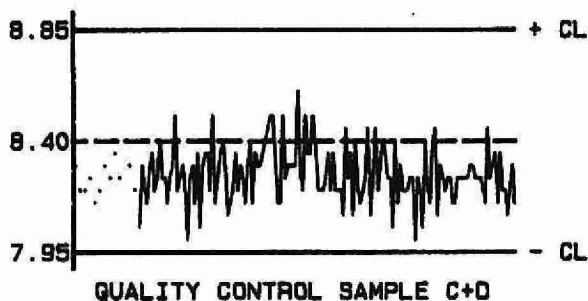
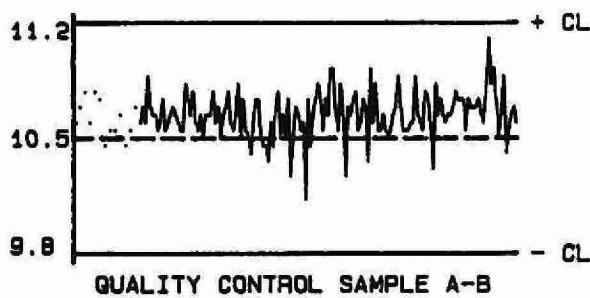
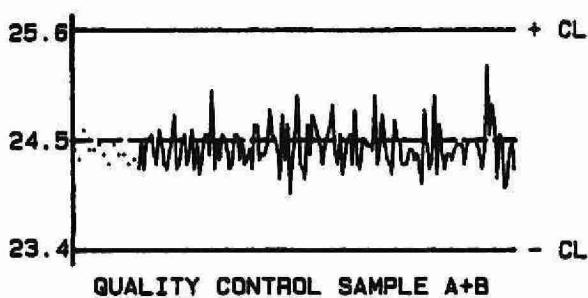
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	153	0.00 - 1.00	0.090	18.8
	71	1.00 - 2.00	0.162	11.0
	72	2.00 - 5.00	0.326	10.0
	63	5.0 - 10.0	0.29	4.0
	102	10.0 - 25.0	0.40	2.3
	461	Overall	0.26	N/A

OTHER CHECKS:

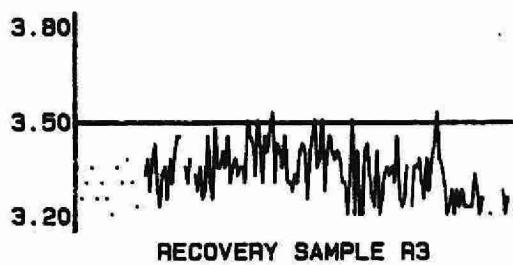
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
Long Term Blank :	163	0.06	0.043
Digested Blank :	164	0.03	0.047

QUALITY CONTROL GRAPHS NITROGEN - TOTAL KJELDAHL (MG/L AS N)

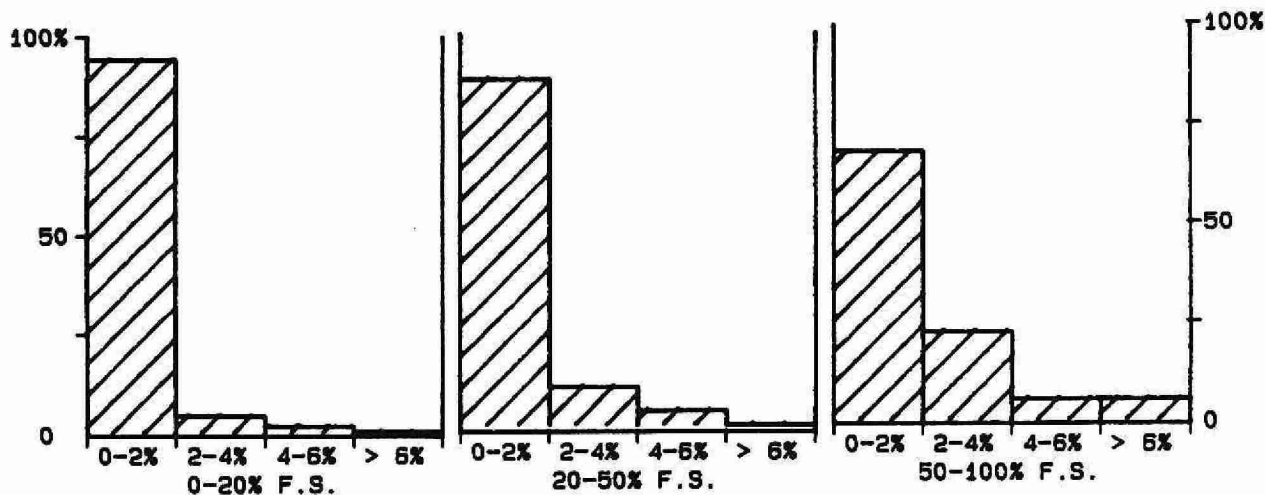
FROM: 05/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



***** OXYGEN - BIOCHEMICAL DEMAND *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001AI2	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required : 400 mL
Container : Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Using dissolved oxygen (DO) analyses, samples are measured for oxygen depletion before and after a five day period (BOD5) of storage in the dark at 20°C. If necessary, dilutions are made with aerated, nutrient-enriched water to obtain a 50-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples calculation of an appropriate seed correction is required.

INSTRUMENTATION:

- Weston and Stack Oxygen analyzer with DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen.
- Titration equipment for Winkler analysis of dissolved oxygen.
- Incubator (19-21°C); BOD bottles (300 mL)

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION (DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

CONTROLS:

Calibration (DO) : 2 QC solutions of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the Oxygen Analyzer and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO Analyzer.
Recovery (BOD5) : 3 Recovery standards prepared from a combination of Glucose and

Glutamic Acid e.g. R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.

Drift : Air saturated distilled water after every 24 samples.

MODIFICATIONS:

01/05/81 -Quality control program for DO was expanded, and the use of standard 300 mL BOD bottles was restored.

35/06/85 -Digital burette (readability to 0.01 mL) replaced glass burette.

03/03/86 -Microcomputer system interfaced to oxygen meter for workstation control and direct computer input.

OXYGEN DEMAND - BIOCHEMICAL
QUALITY CONTROL DATA FROM 08/01/87 TO 31/12/87

Lab: BOD

Analytical Range: 1.5 to 400 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	62	0.00	0.07	0.07	0.115
b :	59	0.00	0.07	0.07	0.125

On any given day the calibration is accepted if the values obtained for A and B lie within the range:

-0.25 to 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	82	2.17	2.18	0.081
r2 :	81	4.34	4.29	0.177
r3 :	77	6.52	6.37	0.269

DUPLICATES:

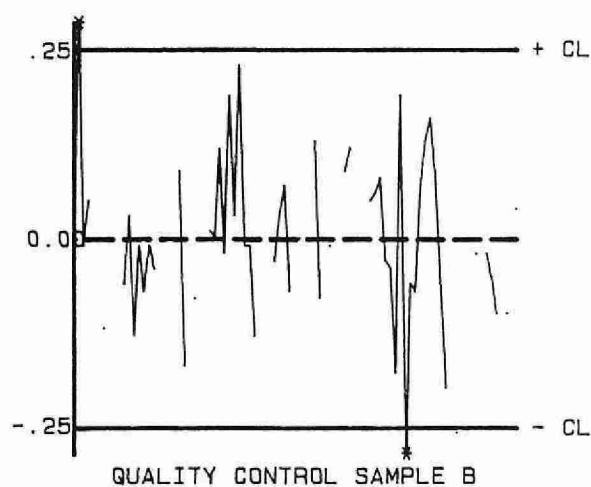
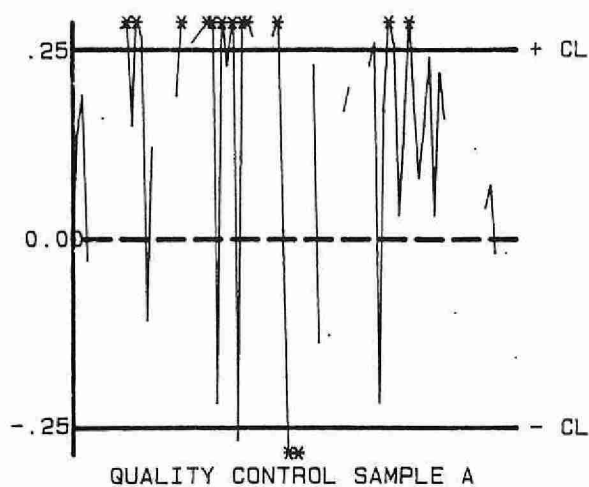
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0.0 - 5.0	0.29	10.4
28	5 - 20	1.3	10.1
21	20 - 50	1.1	3.7
28	50 - 100	1.1	1.6
41	100 - 400	3.6	2.2
137	Overall	2.2	N/A

OTHER CHECKS:

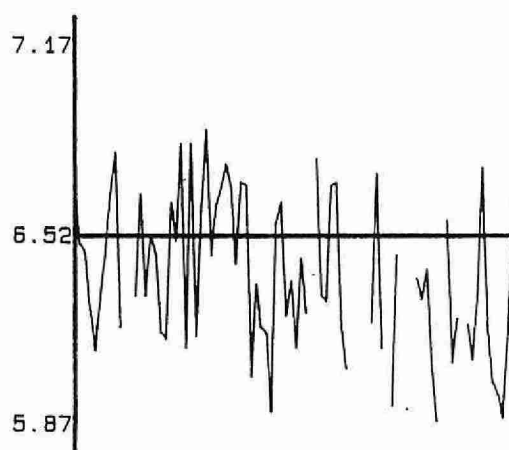
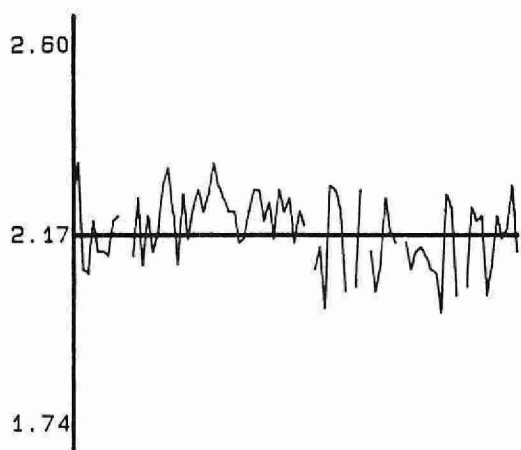
	Number of Data	Data Mean	Standard(1) Deviation
5 day DOW Blank :	86	0.20	0.070
5 day BOD Blank :	85	0.24	0.099

QUALITY CONTROL GRAPHS OXYGEN DEMAND - BIOCHEMICAL (MG/L AS O)

FROM: 08/01/87
TO: 31/12/87

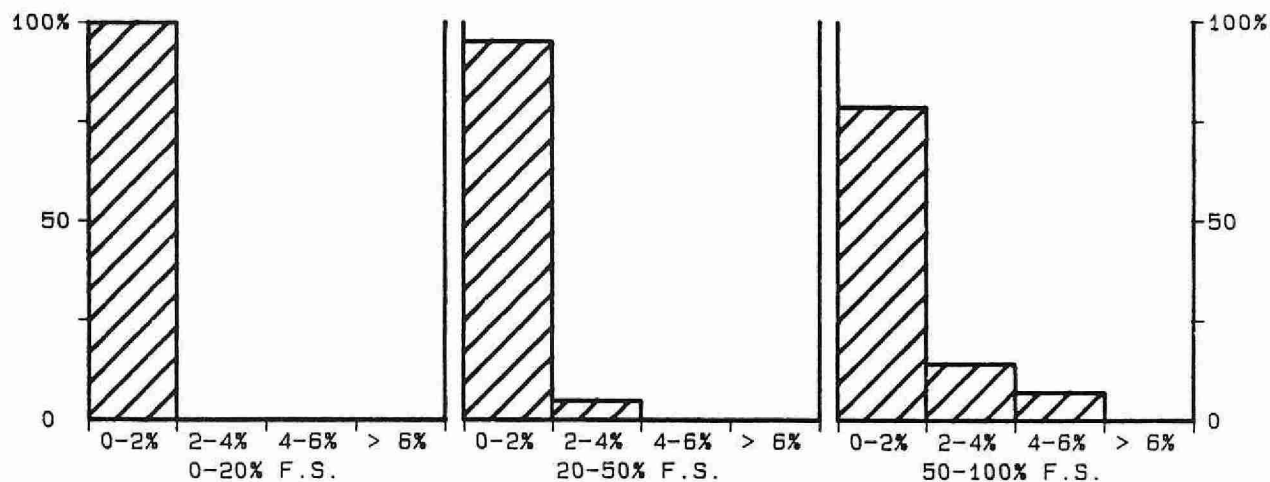


--- EXPECTED VALUE
— CONTROL LIMIT (CL)



RECOVERY SAMPLE R3

* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 400 MG/L AS O
- 236 -

***** OXYGEN -CHEMICAL DEMAND *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD, CODF	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2, 101BT6	Supervisor	: M. Rawlings
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150 C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

-Culture tubes with Teflon closures; mechanical-convection oven
-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration : 2 digested standards, e.g. QCA
Recovery : 2 digested standards, e.g. R1
Drift : Undigested BL every 10 samples; standard plus BL at end of run
Interference : Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

MODIFICATIONS:

30/06/82 -Manual COD procedure described in HAMES was discontinued. Development report on the current procedure, described above, is available on request.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week.

OXYGEN DEMAND - CHEMICAL
QUALITY CONTROL DATA FROM 09/01/87 TO 09/12/87

Lab: Colourimetry

Analytical Range: 4.5 to 100.0 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	40.0	39.7	-0.3	1.81
b :	25	10.0	9.8	-0.2	0.99
a+b :	25	50.0	49.5	-0.5	2.32
a-b :	25	30.0	29.9	-0.1	1.77

s.d.(AB): Sw(within run): 1.25 S(between runs): 1.46 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.0 to 53.0 for A+B
 28.0 to 32.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	18	36.0	31.0	3.39
r2 :	18	9.0	7.1	2.54

DUPLICATES:

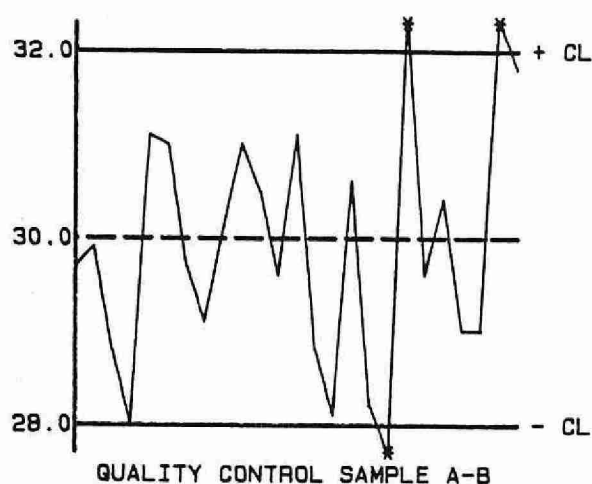
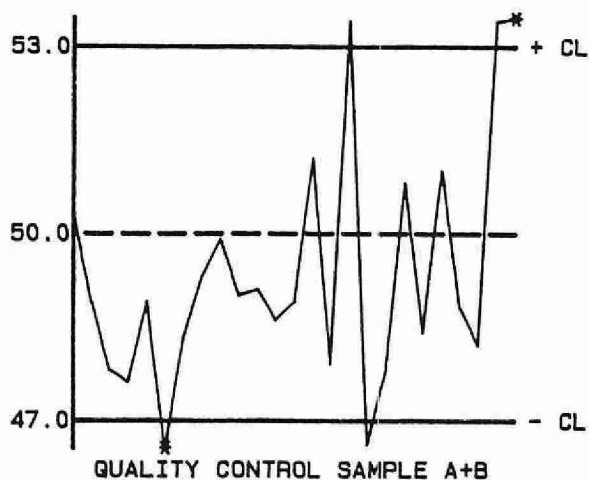
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.0 - 10.0	0.90	16.7
21	10.0 - 20.0	1.29	8.5
6	20.0 - 50.0	2.51	10.3
0	50.0 - 100.0	N/A	N/A
35	Overall	1.50	N/A

OTHER CHECKS:

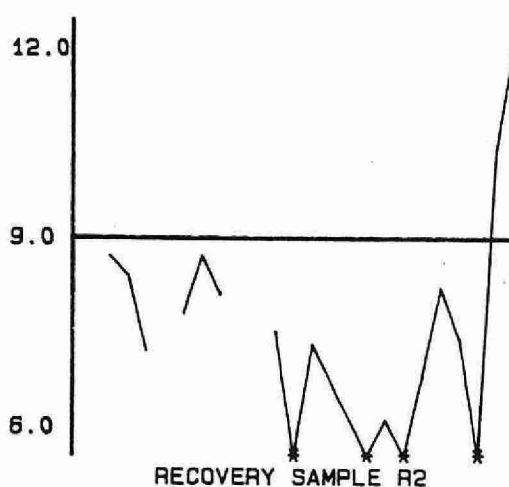
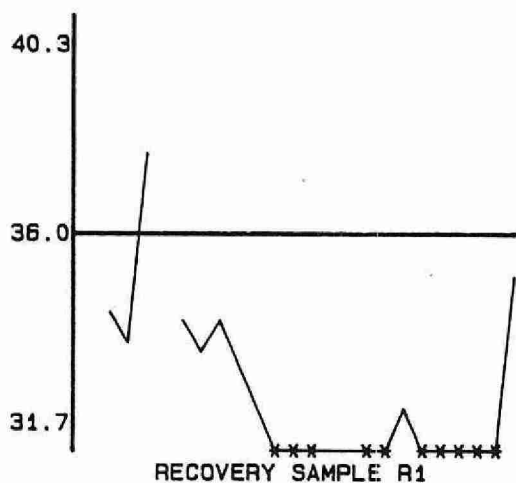
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check :	14	39.0	0.64
Digested Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS OXYGEN DEMAND - CHEMICAL (MG/L)

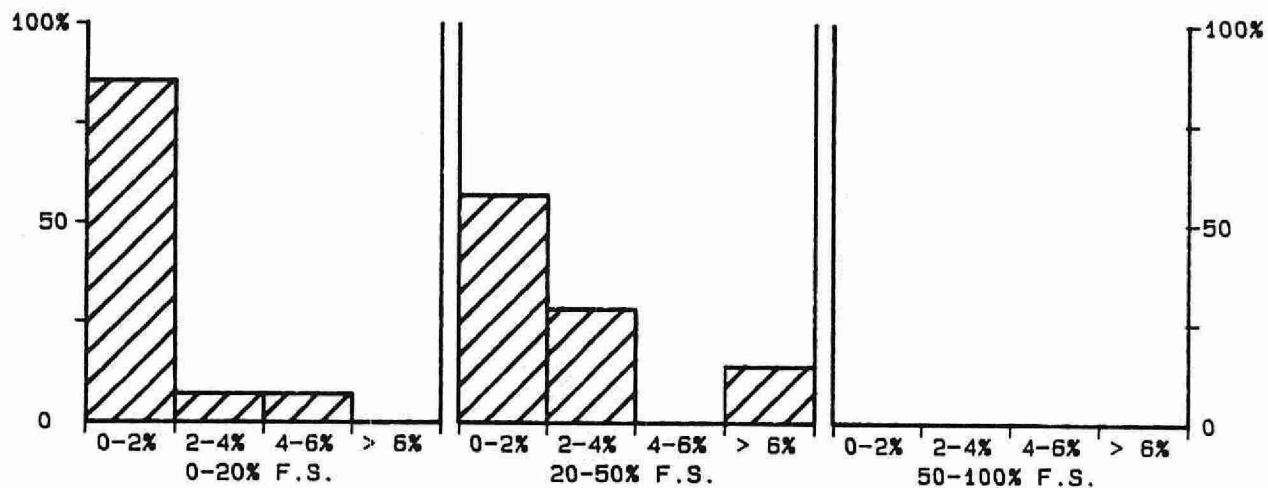
FROM: 09/01/87
TO: 09/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L

***** OXYGEN -CHEMICAL DEMAND *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: SBCOD	Unit Code	: 064808
Method Code	: 002AC0	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required : 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150°C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.6 at the full scale level.

INSTRUMENTATION:

- Culture tubes with Teflon closures; mechanical-convection oven
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

MODIFICATIONS:

30/06/82 -Manual COD procedure described in HAMES was discontinued. Development report on the current procedure, described above, is available on request.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week.

OXYGEN DEMAND - CHEMICAL
QUALITY CONTROL DATA FROM 21/01/87 TO 10/12/87

Lab: Colourimetry

Analytical Range: 11 to 500 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	400	394	-6	8.1
b :	29	100	101	1	5.1
a+b :	29	500	495	-5	9.7
a-b :	29	300	293	-7	9.4

s.d.(AB): Sw(within run): 6.6 S(between runs): 6.8 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

463 to 537 for A+B
 275 to 325 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	27	390	376	18.3
r2 :	27	98	98	8.9

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0 - 50	2.1	10.0
5	50 - 100	7.3	10.0
5	100 - 250	1.8	1.2
7	250 - 500	34.7	8.8
29	Overall	17.4	N/A

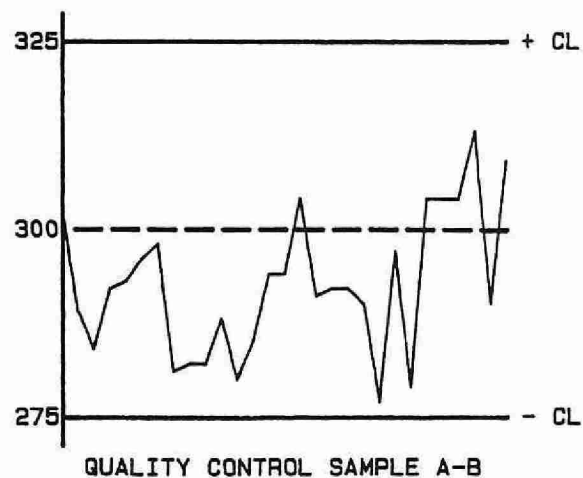
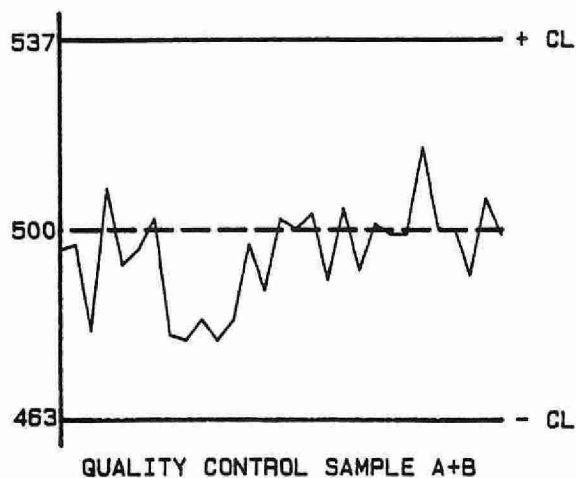
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check :	18	50	4.8
Digested Blank :	0	N/A	N/A

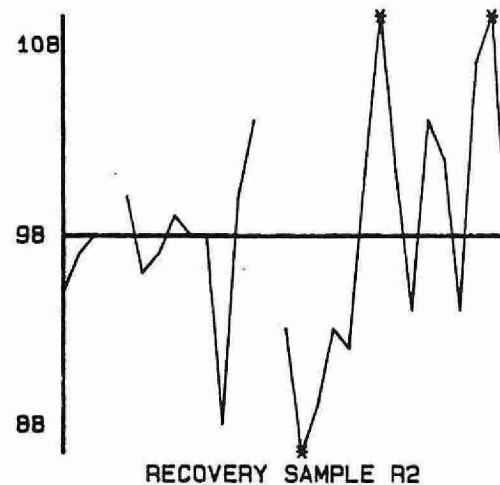
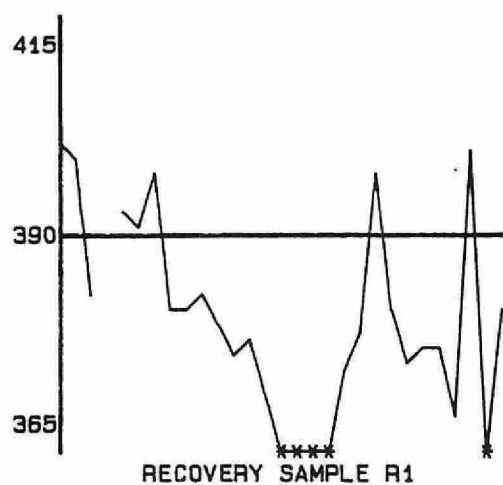
QUALITY CONTROL GRAPHS OXYGEN DEMAND - CHEMICAL (MG/L AS O)

FROM: 21/01/87

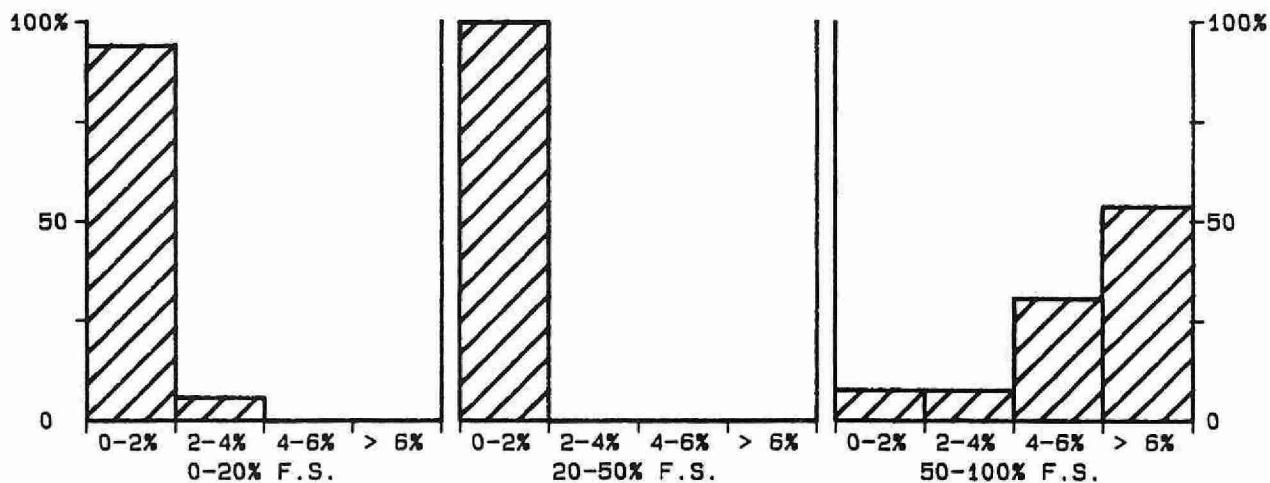
TO: 10/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 MG/L AS O

*** PH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: PH	Units	: dimensionless
Work Station Code	: DOCOP	Unit Code	: nil
Method Code	: 0903PH	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required : 100 mL
Container : Plastic or BOD bottle filled to the brim; screw caps with cone-shaped liners.

ANALYTICAL PROCEDURE:

PH is measured directly on a stirred sample (50 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

PH
QUALITY CONTROL DATA FROM 07/01/87 TO 28/07/87

Lab: Dorset

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	69	6.80	6.76	-0.04	0.037
b :	69	4.00	4.00	-0.00	0.034
a+b :	69	10.80	10.75	-0.05	0.051
a-b :	69	2.80	2.76	-0.04	0.048

s.d.(AB): Sw(within run): 0.034 S(between runs): 0.036 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

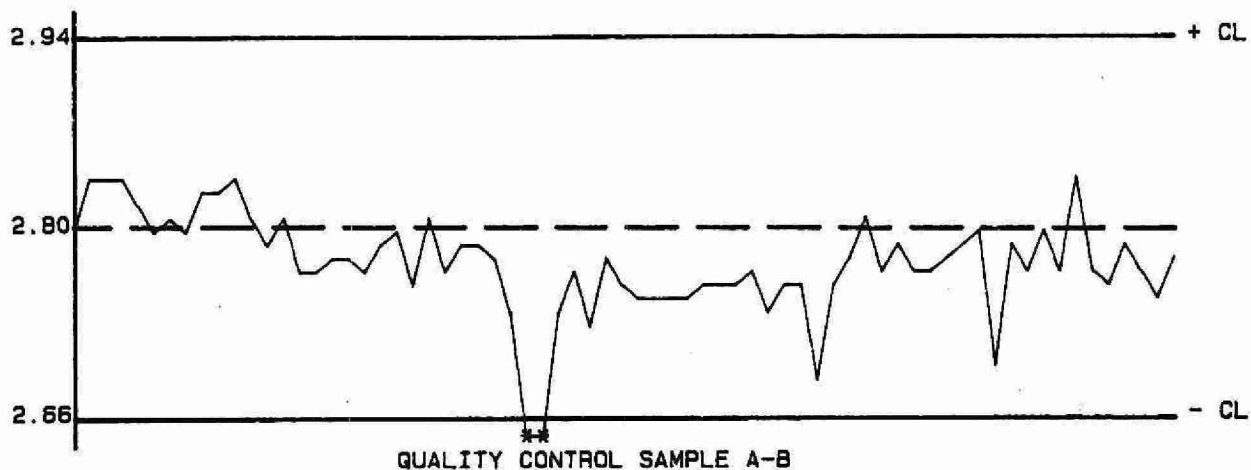
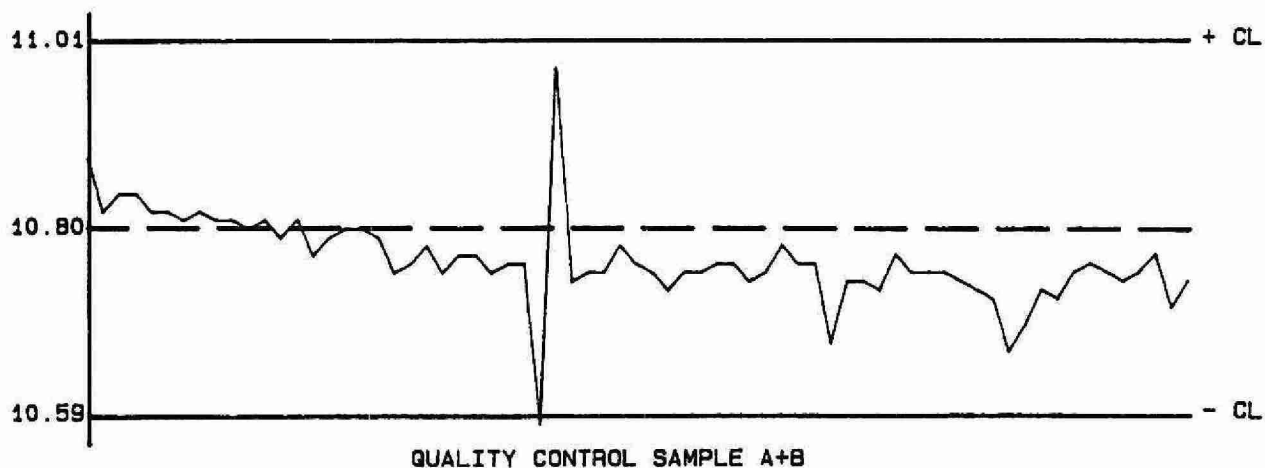
10.59 to 11.01 for A+B
2.66 to 2.94 for A-B

DUPLICATES:

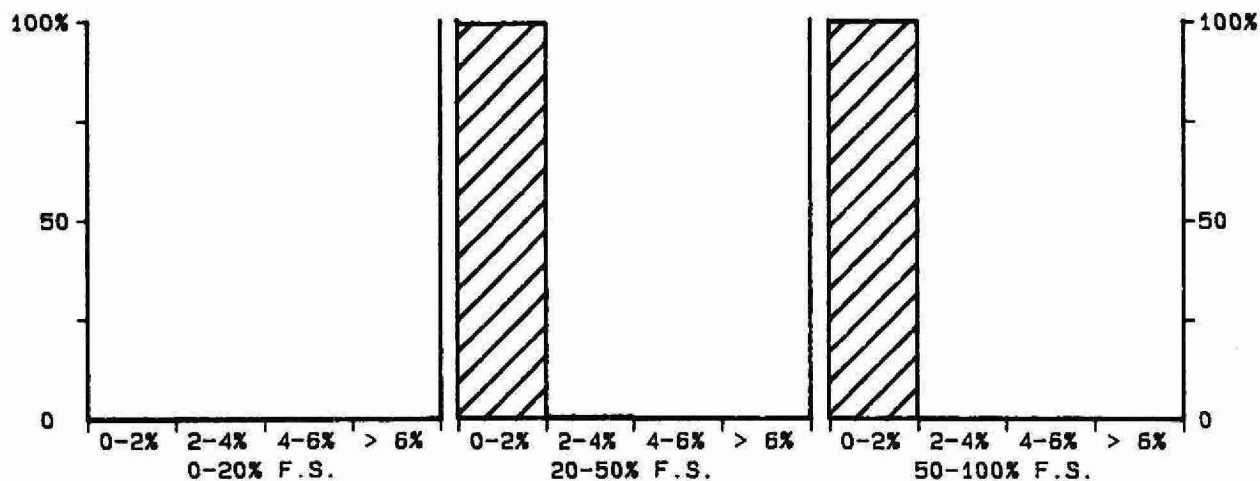
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 4.00	N/A	N/A
57	4.00 - 5.50	0.022	0.4
130	5.50 - 7.00	0.035	0.5
15	7.00 - 8.50	0.052	0.6
1	8.50 - 14.00	N/A	N/A
204	Overall	0.034	N/A

QUALITY CONTROL GRAPHS PH (DIMENTIONLESS)

FROM: 07/01/87
TO: 28/07/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENTIONLESS

***** PH *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: PH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: nil
Method Code	: 0902PH	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 250 mL
Container	: Polystyrene or BOD bottle filled to the brim; screw caps with cone-shaped liners.

ANALYTICAL PROCEDURE:

PH is measured directly on a stirred sample (100 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.
N.B. Alkalinity (Gran) was performed simultaneously.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration	: BL plus 2 standards, e.g. QCA, QCB
Drift	: 2 standard buffers - 2 times daily

PH
QUALITY CONTROL DATA FROM 02/01/87 TO 24/12/87

Lab: Dorset

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	214	6.80	6.76	-0.04	0.028
b :	214	4.00	3.96	-0.04	0.029
a+b :	214	10.80	10.72	-0.08	0.049
a-b :	214	2.80	2.80	-0.00	0.028

s.d.(AB): Sw(within run): 0.020 S(between runs): 0.029 S/Sw: 1.44

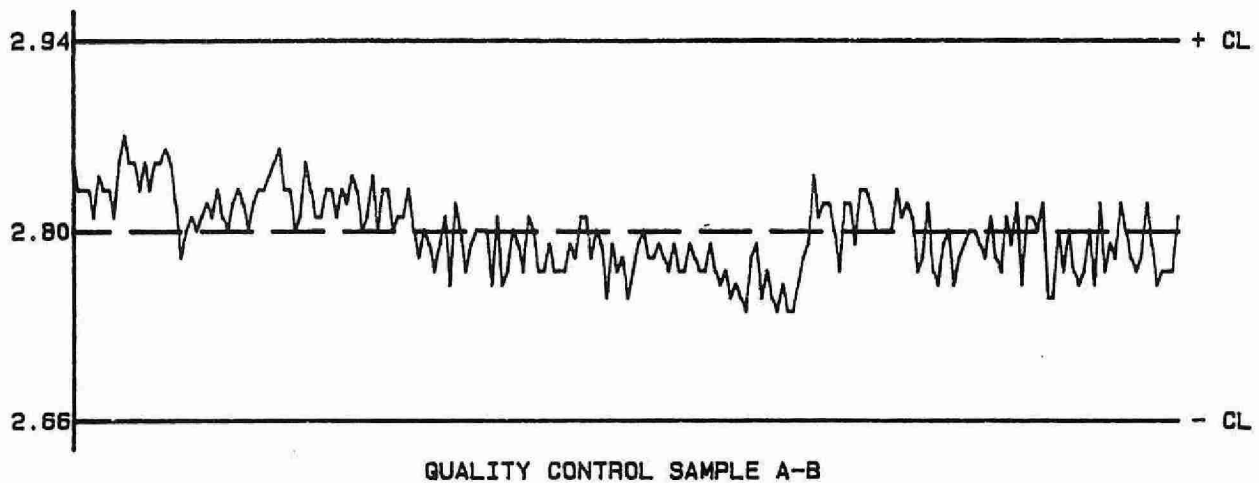
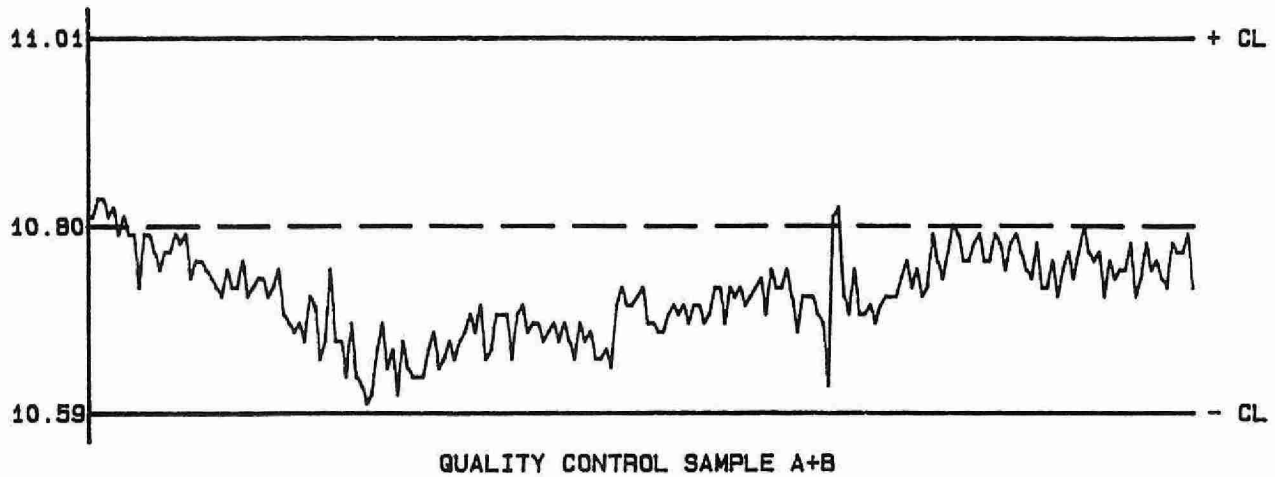
On any given day the calibration is accepted if the values obtained lie within the ranges:

10.59 to 11.01 for A+B
2.66 to 2.94 for A-B

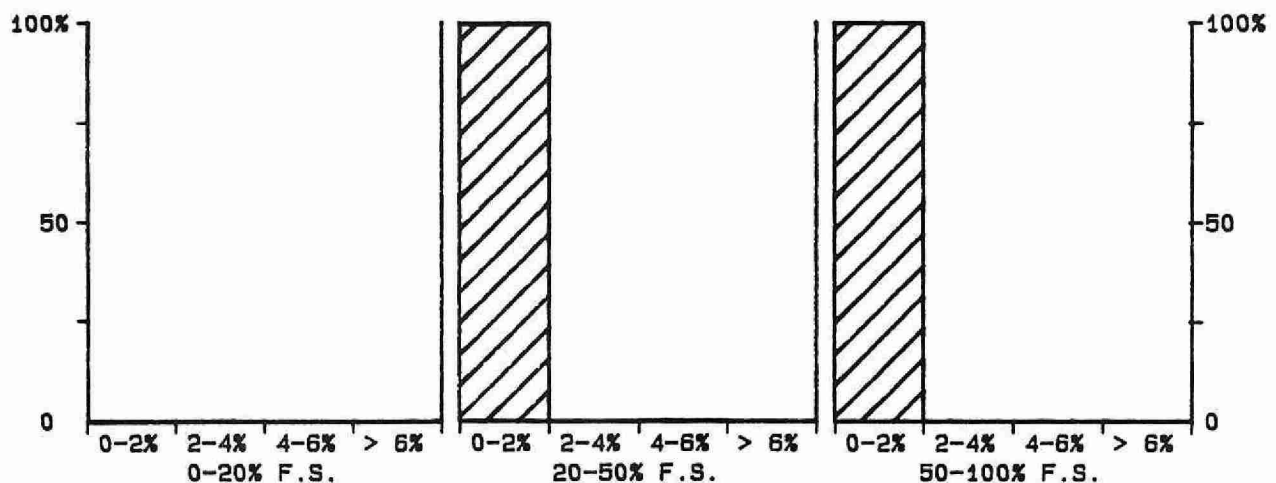
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	1	0.00 - 4.00	N/A	N/A
	73	4.00 - 5.50	0.034	0.6
	497	5.50 - 7.00	0.045	0.7
	24	7.00 - 8.50	0.053	0.7
	1	8.50 - 14.00	N/A	N/A
	596	Overall	0.044	N/A

QUALITY CONTROL GRAPHS PH (DIMENTIONLESS)

FROM: 02/01/87
TO: 24/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENTIONLESS

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: nil
Method Code	: 002A11	Supervisor	: P. Campbell
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required : 15 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.

N.B. pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

MODIFICATIONS:

01/04/82 -Sample volume was decreased from 100.0 to 10.0 mL.

01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.

30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

PH - ACIDITY
QUALITY CONTROL DATA FROM 07/01/87 TO 23/12/87

Lab: Titration

Analytical Range: N/A to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	96	6.86	6.87	0.01	0.010
b :	96	4.01	4.00	-0.01	0.008
a+b :	96	10.87	10.87	0.00	0.012
a-b :	96	2.85	2.87	0.02	0.013

s.d.(AB): Sw(within run): 0.009 S(between runs): 0.009 S/Sw: 0.99

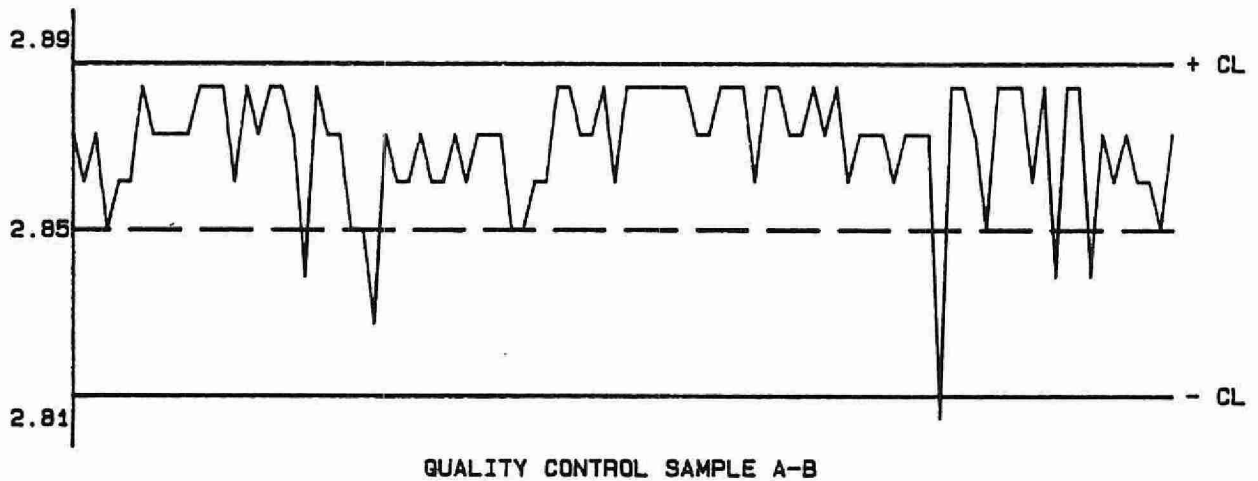
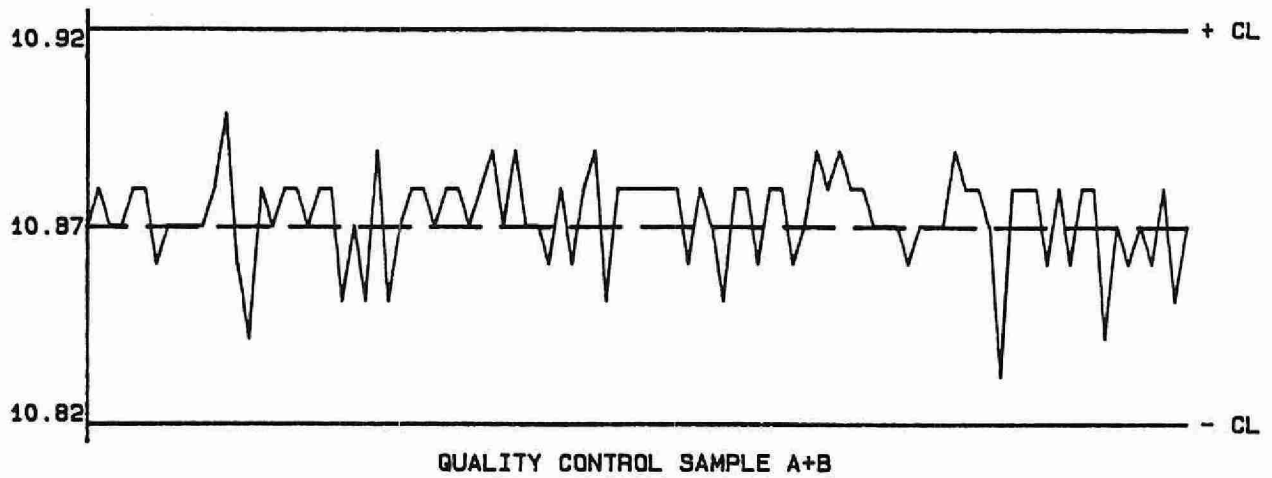
On any given day the calibration is accepted if the values obtained lie within the ranges:

10.82 to 10.92 for A+B
 2.82 to 2.89 for A-B

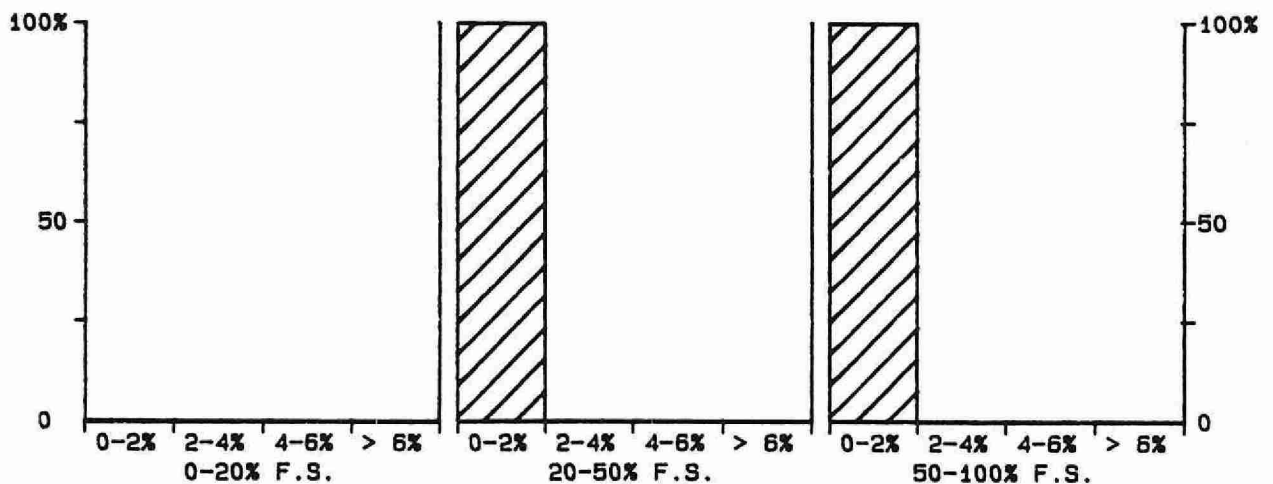
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var.(%)
	0	0.00 - 3.00	N/A	N/A
	17	3.00 - 4.00	0.019	0.4
	147	4.00 - 5.00	0.028	0.6
	48	5.00 - 7.00	0.058	0.9
	10	7.00 - 14.00	0.046	0.5
	222	Overall	0.037	N/A

QUALITY CONTROL GRAPHS PH - ACIDITY (DIMENSIONLESS)

FROM: 07/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS
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***** PH *****

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: nil
Method Code	: 003A12	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

PH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.

N.B. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : 2 "standards", e.g. QCA
Drift : In run standards throughout the run (diluted tap water 20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity-total fixed endpoint and alkalinity-Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

PH - RIVER TITRATION
QUALITY CONTROL DATA FROM 05/01/87 TO 31/12/87

Lab: Titration

Analytical Range: N/A to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	88	4.45	4.46	0.01	0.025
b :	88	3.75	3.76	0.01	0.020
a+b :	88	8.20	8.22	0.02	0.034
a-b :	88	0.70	0.70	0.00	0.030

s.d.(AB): Sw(within run): 0.021 S(between runs): 0.023 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

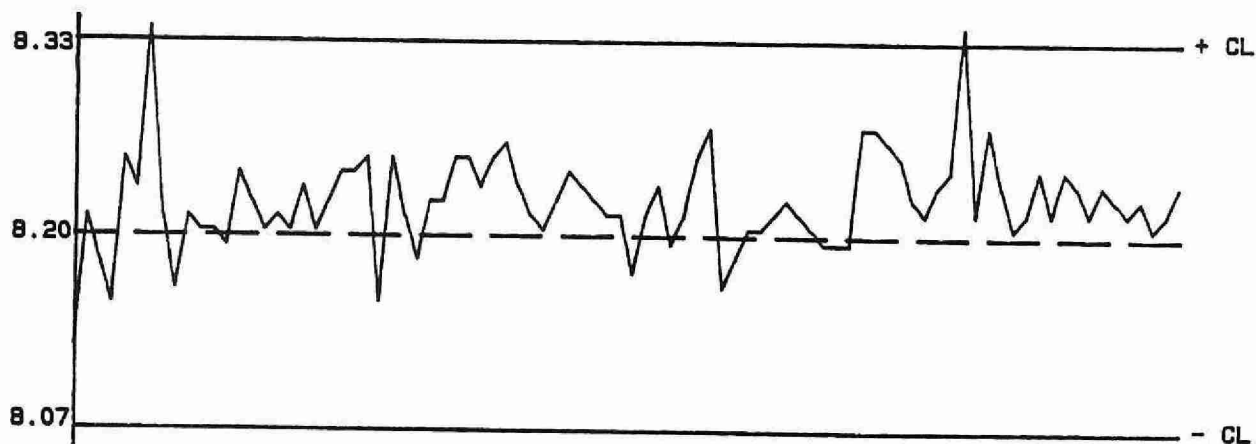
8.07 to 8.33 for A+B
0.61 to 0.79 for A-B

DUPLICATES:

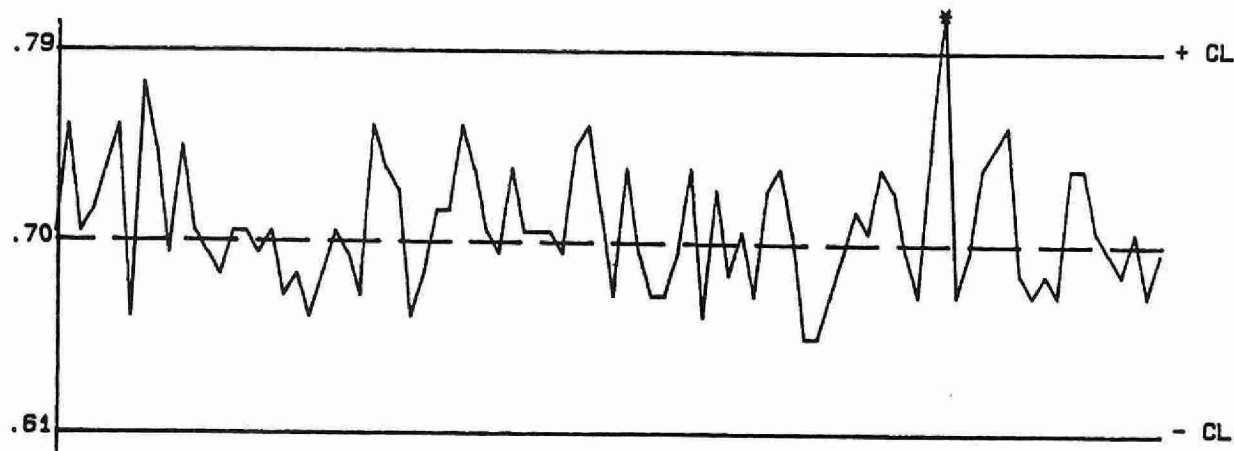
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 5.00	N/A	N/A
2	5.00 - 6.00	0.099	1.8
22	6.00 - 7.00	0.068	1.0
201	7.00 - 9.00	0.060	0.7
2	9.00 - 14.00	0.032	0.3
227	Overall	0.061	N/A

QUALITY CONTROL GRAPHS PH - RIVER TITRATION (DIMENSIONLESS)

FROM: 05/01/87
TO: 31/12/87

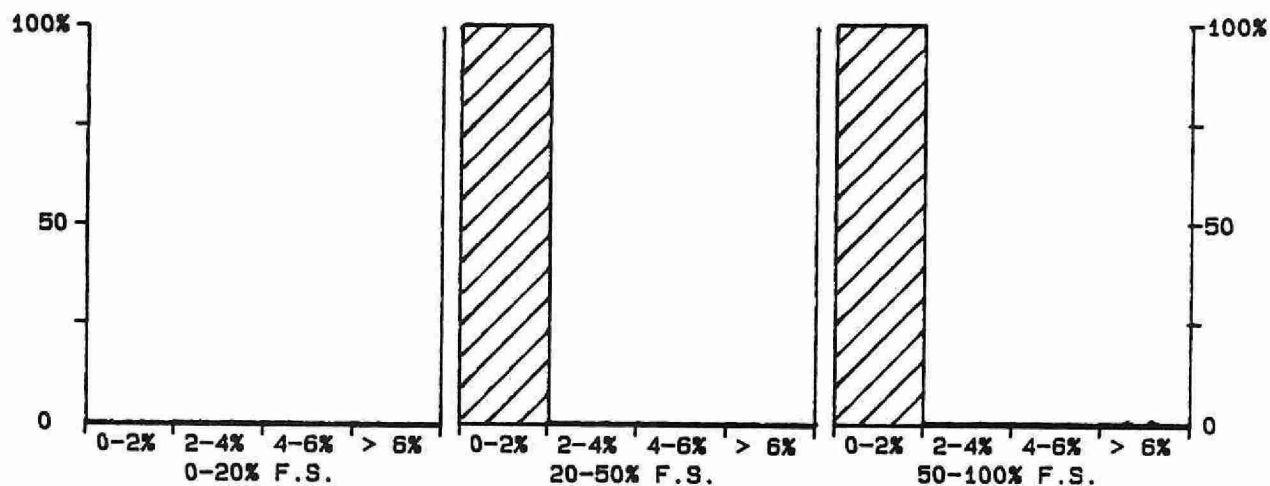


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: nil
Method Code	: 003A12	Supervisor	: P. Campbell
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

PH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.

N.B. pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 7

CONTROLS:

Calibration : 2 "standards", e.g. QCA
Drift : In run standards throughout the run (diluted tab water 50% V/V)

MODIFICATIONS:

14/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

PH - WATER TITRATION
QUALITY CONTROL DATA FROM 06/01/87 TO 30/12/87

Lab: Titration

Analytical Range: N/A to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	116	9.18	9.19	0.01	0.038
b :	116	4.45	4.50	0.05	0.052
a+b :	116	13.63	13.69	0.06	0.062
a-b :	116	4.73	4.70	-0.03	0.067

s.d.(AB): Sw(within run): 0.047 S(between runs): 0.046 S/Sw: 0.96

On any given day the calibration is accepted if the values obtained lie within the ranges:

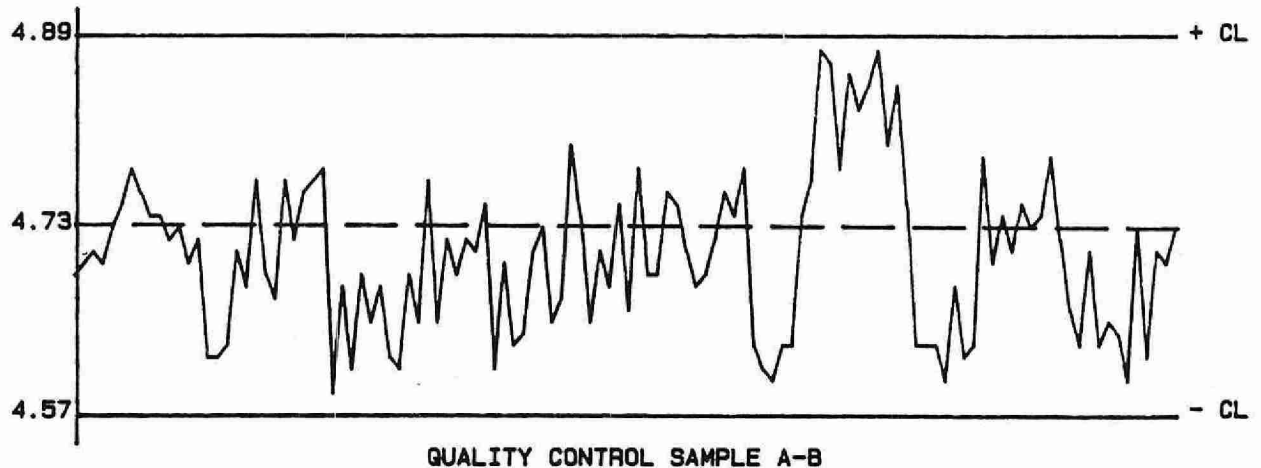
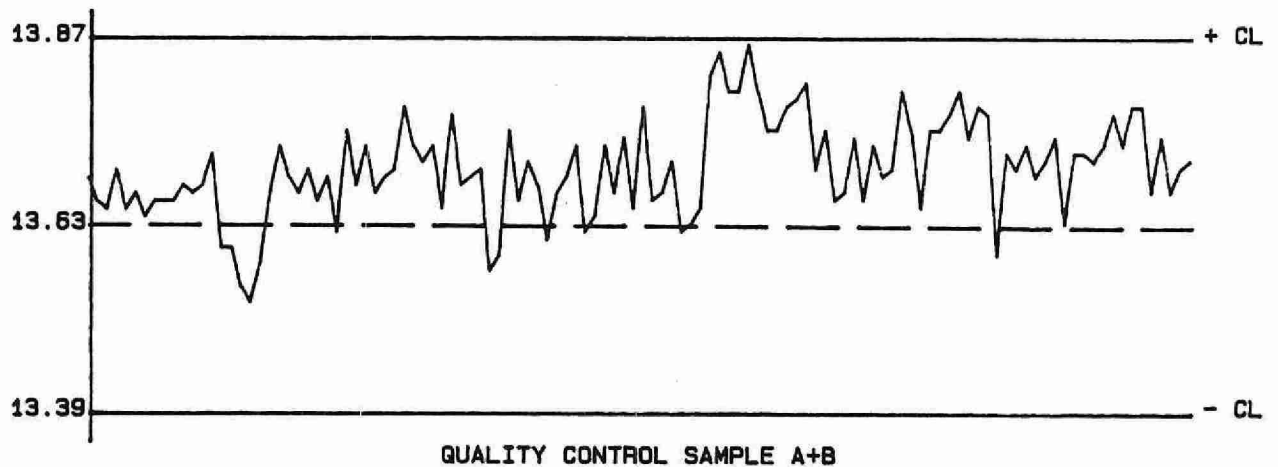
13.39 to 13.87 for A+B
4.57 to 4.89 for A-B

DUPLICATES:

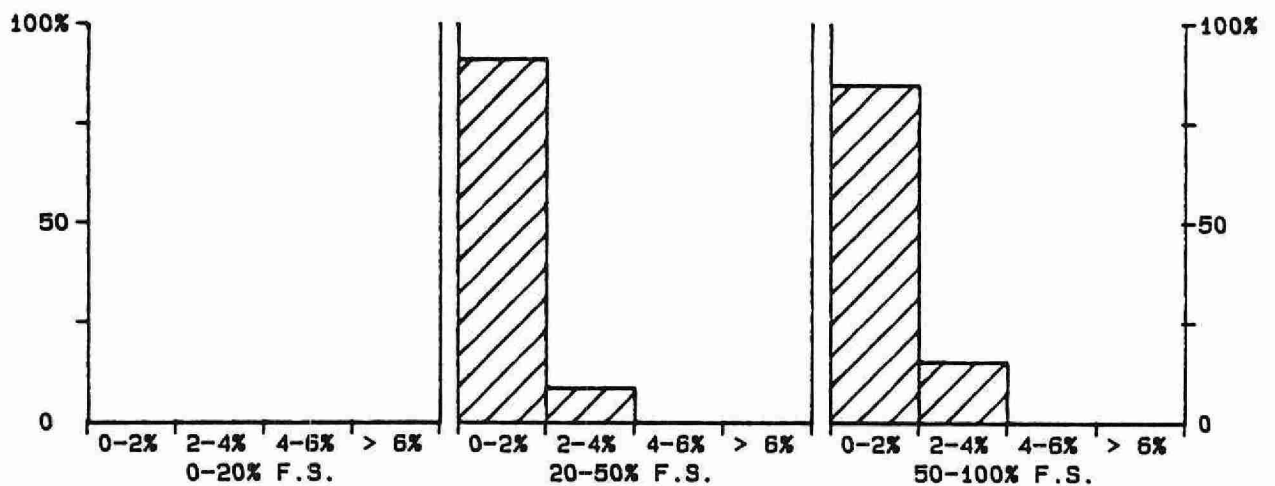
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 5.00	N/A	N/A
5	5.00 - 6.00	0.103	1.7
17	6.00 - 7.00	0.138	2.0
274	7.00 - 9.00	0.139	1.7
0	9.00 - 14.00	N/A	N/A
297	Overall	0.138	N/A

QUALITY CONTROL GRAPHS PH - WATER TITRATION (DIMENSIONLESS)

FROM: 06/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '70
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WQSDIRT	Unit Code	: Nil
Method Code	: 004AI1	Supervisor	: P. Campbell
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (15 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, Radiometer combination electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : 2 standard buffers

pH WQSDIRT
QUALITY CONTROL DATA FROM 21/05/87 TO 22/12/87

Lab: Titration

Analytical Range: 0.15 to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	95	8.00	7.97	-0.03	0.042
b :	95	6.00	5.99	-0.01	0.023
a+b :	95	14.00	13.96	-0.04	0.042
a-b :	95	2.00	1.98	-0.02	0.052

s.d.(AB): Sw(within run): 0.037 S(between runs): 0.034 S/Sw: 0.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

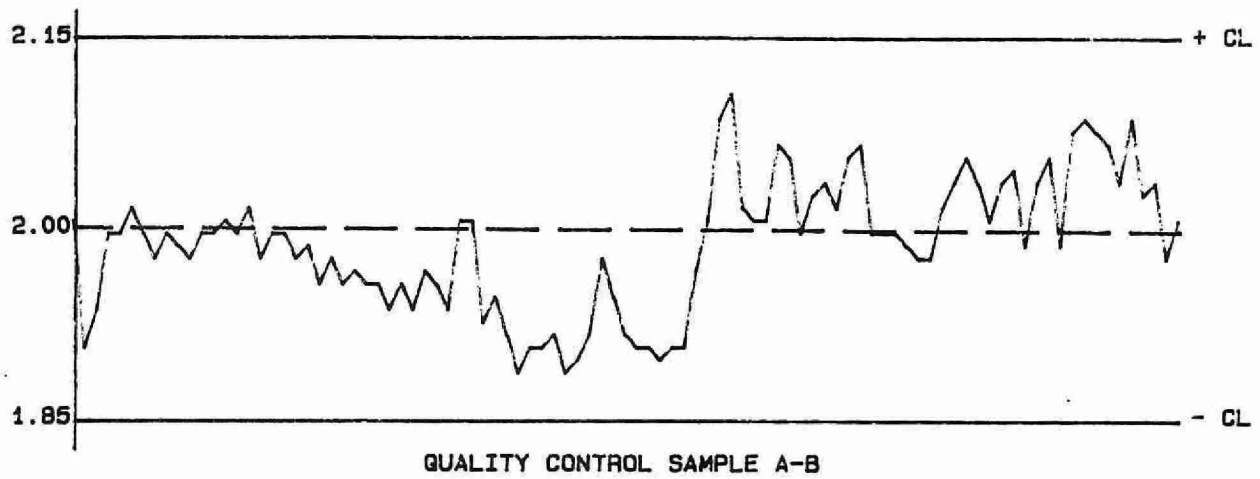
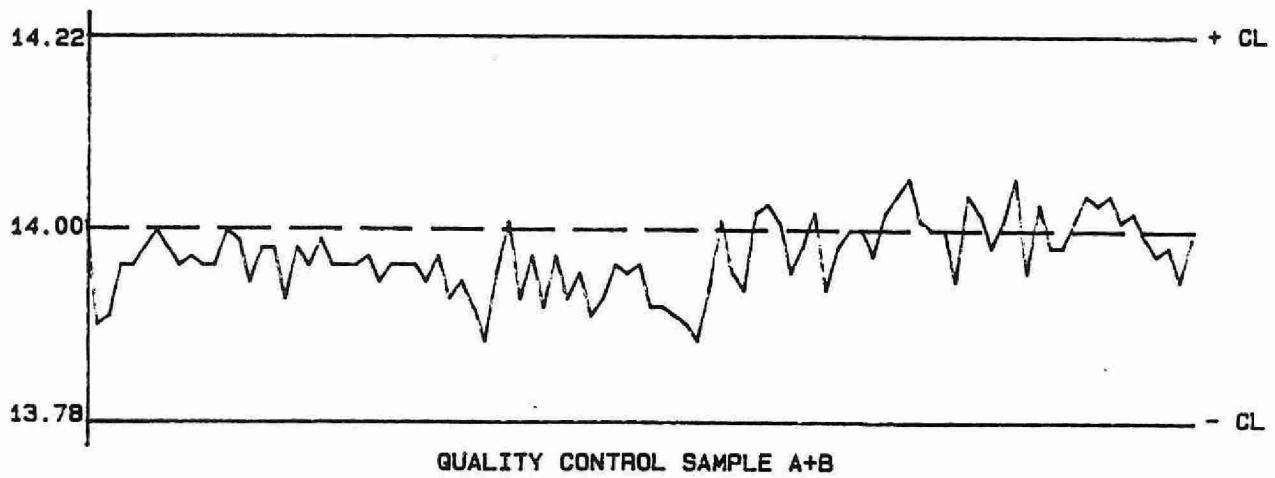
13.78 to 14.22 for A+B
1.85 to 2.15 for A-B

DUPLICATES:

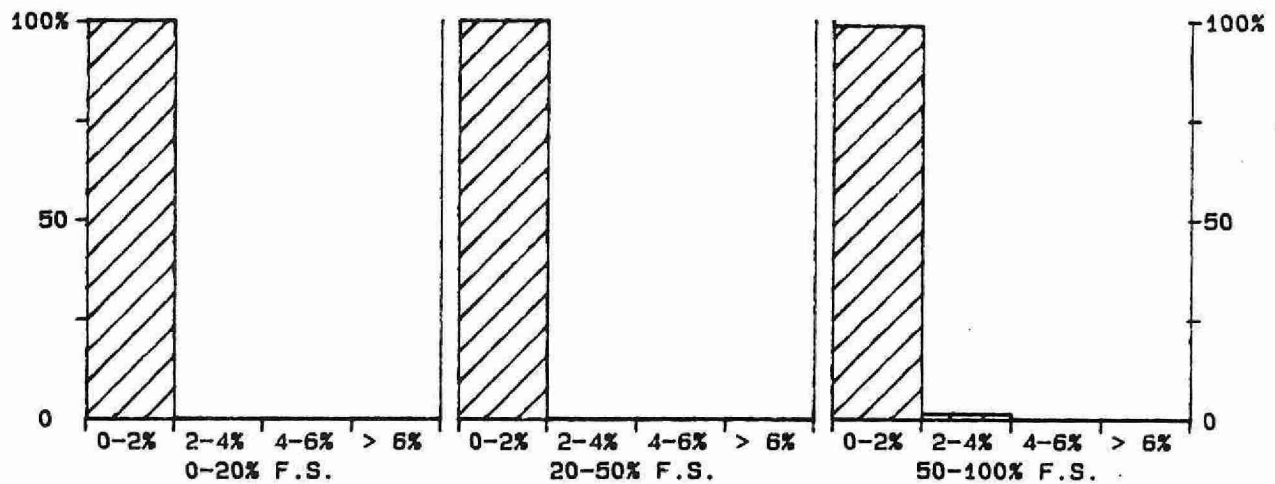
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 5.00	0.030	0.8
9	5.00 - 6.00	0.039	0.7
50	6.00 - 7.00	0.046	0.6
131	7.00 - 8.00	0.051	0.6
24	8.00 - 14.00	0.042	0.4
223	Overall	0.048	N/A

QUALITY CONTROL GRAPHS PH WQSDIRT (DIMENSIONLESS)

FROM: 21/05/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14 DIMENSIONLESS

***** PH SOIL (Xca) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHECA	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 324AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL 0.01 M calcium chloride are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. PH is measured on the supernatant.

INSTRUMENTATION:

-Corning pH/ion meter 150
-Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 2 Calculated W value: N/A T value: N/A

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers
Recovery : 2 long term soil samples plus a round robin CSSC sample (latter run occasionally).

MODIFICATIONS:

01/10/80 -Radiometer PHM62 replaced Fisher pH meter.
01/05/84 -Corning pH/ion meter 150 replaced Radiometer PHM62.
01/02/84 -Samples are agitated in a tube for 20 minutes as opposed to being stirred intermittently in a beaker for 30 minutes.

PH-SOIL (XCa)
QUALITY CONTROL DATA FROM 05/06/87 TO 11/08/87

Lab: Dorset Soils

Analytical Range: 0.28 to 10.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	7.04	7.04	0.00	0.009
b :	8	4.00	4.00	0.00	0.005
a+b :	8	11.04	11.05	0.01	0.009
a-b :	8	3.04	3.04	-0.00	0.011
c :	8	4.00	4.00	0.00	0.005
d :	8	6.80	6.81	0.01	0.004
c+d :	8	10.80	10.81	0.01	0.005
c-d :	8	-2.80	-2.81	-0.01	0.007

s.d.(AB): Sw(within run): 0.008 S(between runs): 0.007 S/Sw: 0.94
s.d.(CD): Sw(within run): 0.005 S(between runs): 0.005 S/Sw: 0.91

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.74 to 11.34 for A+B
2.84 to 3.24 for A-B
10.50 to 11.10 for C+D
-3.00 to -2.60 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	6	4.15	4.14	0.037
r2 :	8	4.64	4.64	0.022

DUPLICATES:

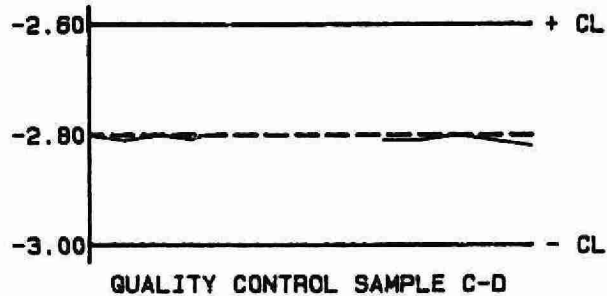
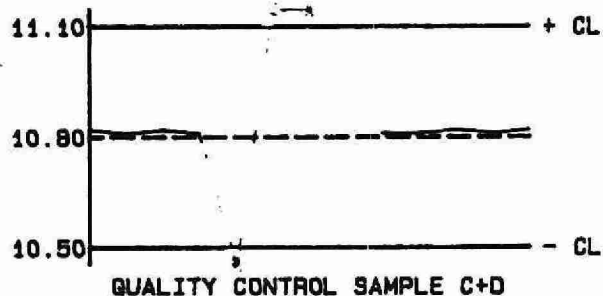
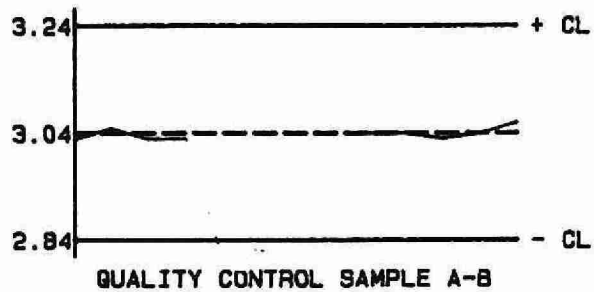
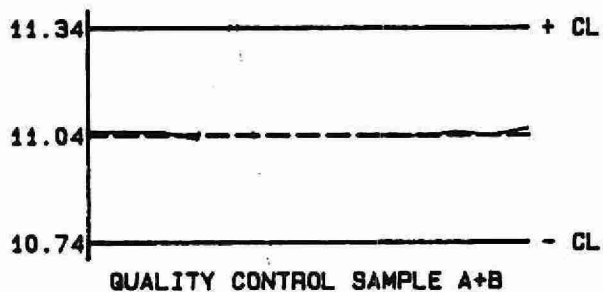
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 5.00	0.055	1.4
10	5.00 - 10.00	0.021	0.3
14	Overall	0.034	N/A

OTHER CHECKS:

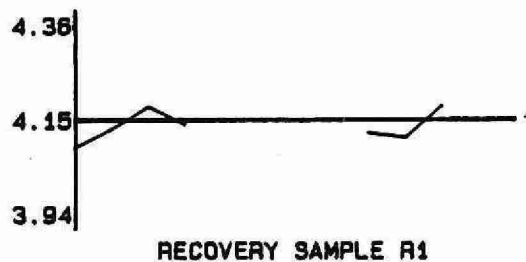
	Number of Data	Data Mean	Standard(1) Deviation
slope :	8	57.3	0.2

QUALITY CONTROL GRAPHS PH-SOIL (XCA)

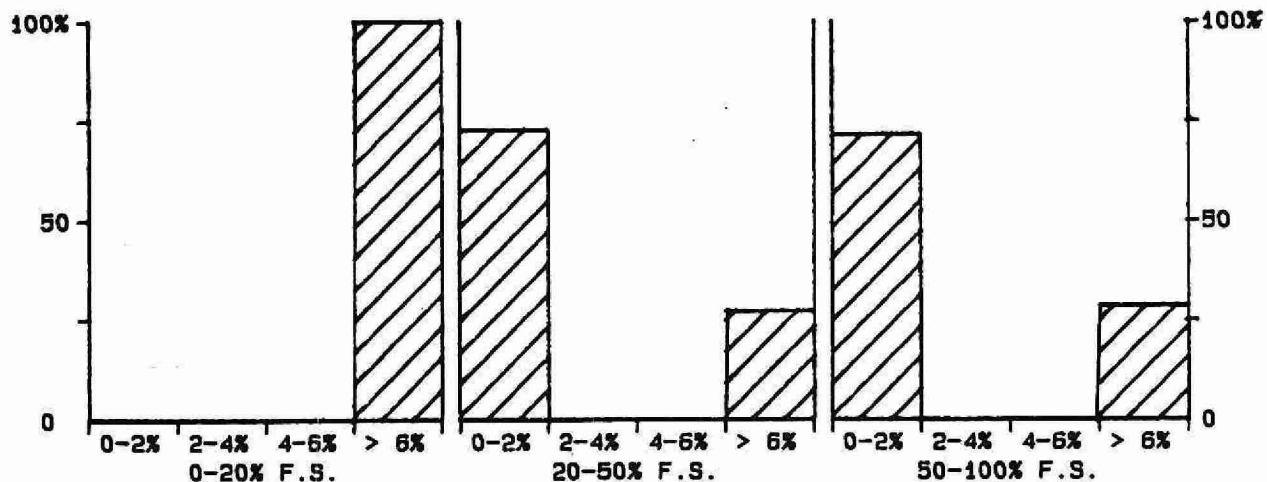
FROM: 05/06/87
TO: 11/08/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



PH-SOIL (XCa)
QUALITY CONTROL DATA FROM 25/09/87 TO 02/12/87

Lab: Dorset Soils

Analytical Range: 0.17 to 10.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	11	7.04	7.05	0.01	0.018
b :	11	4.00	4.00	0.00	0.009
a+b :	11	11.04	11.05	0.01	0.022
a-b :	11	3.04	3.04	0.00	0.018
c :	11	4.00	4.00	0.00	0.009
d :	11	6.80	6.82	0.02	0.018
c+d :	11	10.80	10.82	0.02	0.022
c-d :	11	-2.80	-2.81	-0.01	0.019

s.d.(AB): Sw(within run): 0.013 S(between runs): 0.014 S/Sw: 1.12
s.d.(CD): Sw(within run): 0.013 S(between runs): 0.014 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.74 to 11.34 for A+B
2.84 to 3.24 for A-B
10.50 to 11.10 for C+D
-3.00 to -2.60 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	11	4.50	4.52	0.045
r2 :	11	4.64	4.64	0.037

DUPLICATES:

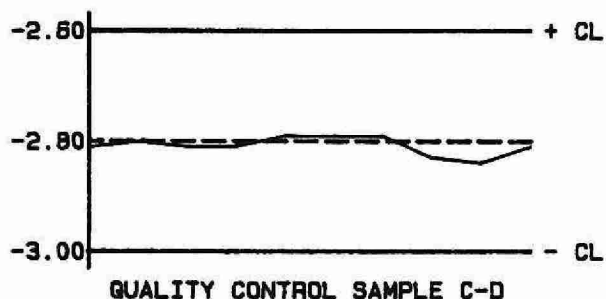
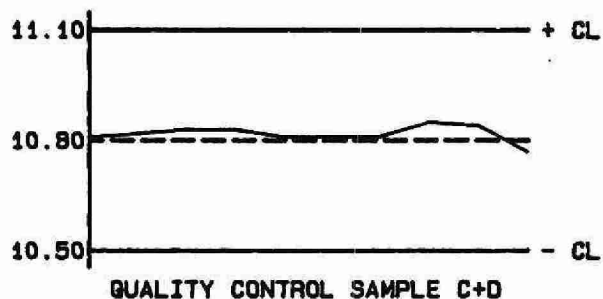
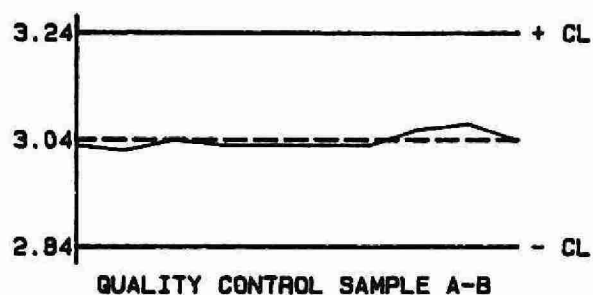
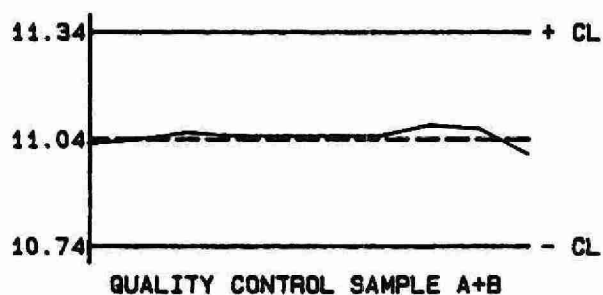
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	0.00 - 5.00	0.035	0.7
7	5.00 - 10.00	0.016	0.2
22	Overall	0.030	N/A

OTHER CHECKS:

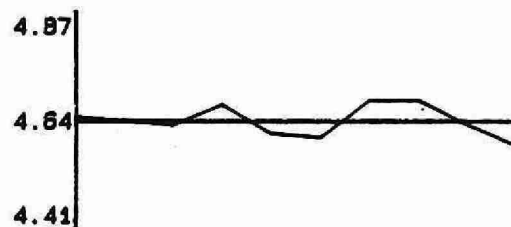
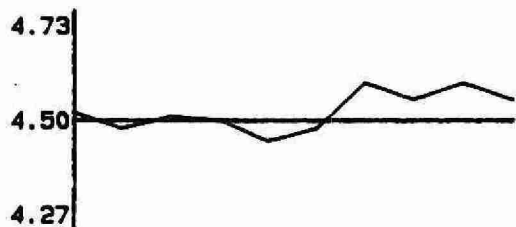
	Number of Data	Data Mean	Standard(1) Deviation
slope :	11	57.4	0.4

QUALITY CONTROL GRAPHS PH-SOIL (XCA)

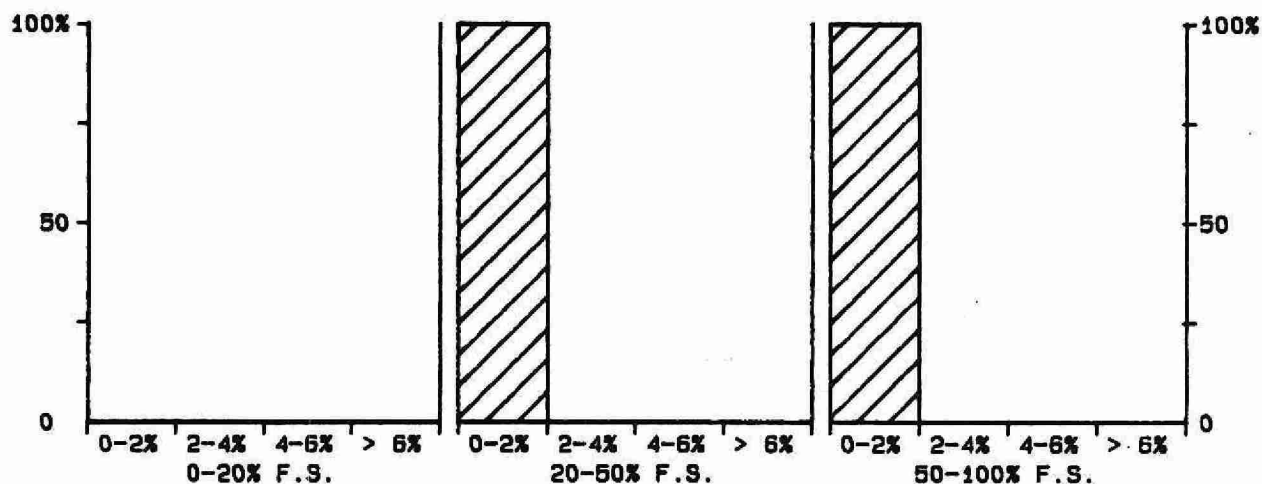
FROM: 25/09/87
TO: 02/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



***** PH SOIL (Xw) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: PHEW	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: nil
Method Code	: 324AB1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggrated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water are agitated in a tube for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. PH is measured on the supernatant.

INSTRUMENTATION:

-Corning pH/ion meter 150
-Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: N/A T value: N/A.

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers
Recovery : 2 long term soil samples plus a round robin CSSC sample (run occasionally).

MODIFICATIONS:

01/10/80 -Radiometer PHM62 replaced Fisher pH meter.
01/05/84 -Corning pH/ion meter 150 replaced Radiometer PHM62.
01/02/84 -Samples are agitated in a tube for 20 minutes as opposed to being stirred intermittently in a beaker for 30 minutes.

PH - SOIL (Xw)
 QUALITY CONTROL DATA FROM 05/06/87 TO 11/08/87

Lab: Dorset Soils

Analytical Range: 0.05 to 9.00 .

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	8	4.45	4.47	0.021
r2 :	8	5.40	5.41	0.020

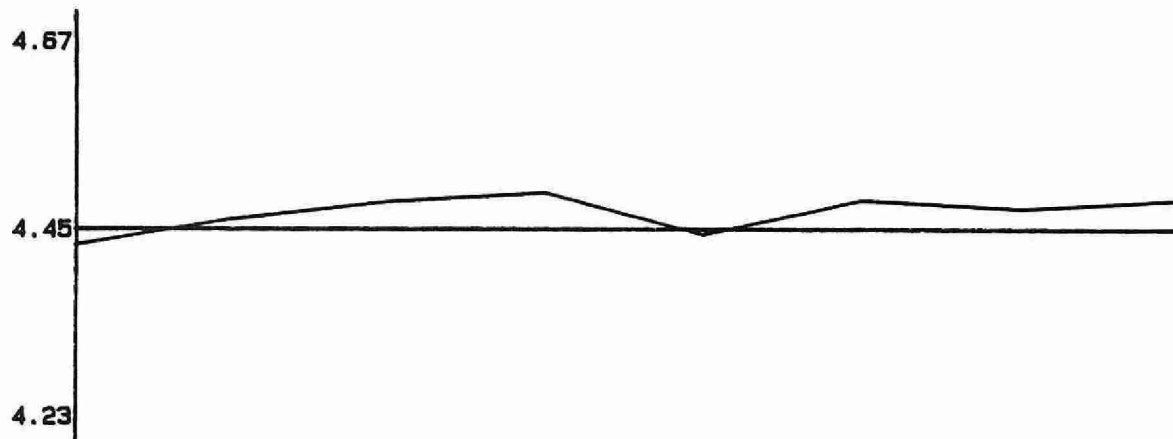
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	2	3.00 - 5.00	0.018	0.4
	10	5.00 - 7.00	0.016	0.2
	4	7.00 - 9.00	0.030	0.4
	16	Overall	0.020	N/A

STANDARD DEVIATION (s.dup1): 0.016 W value: 0.01 T value: 0.05

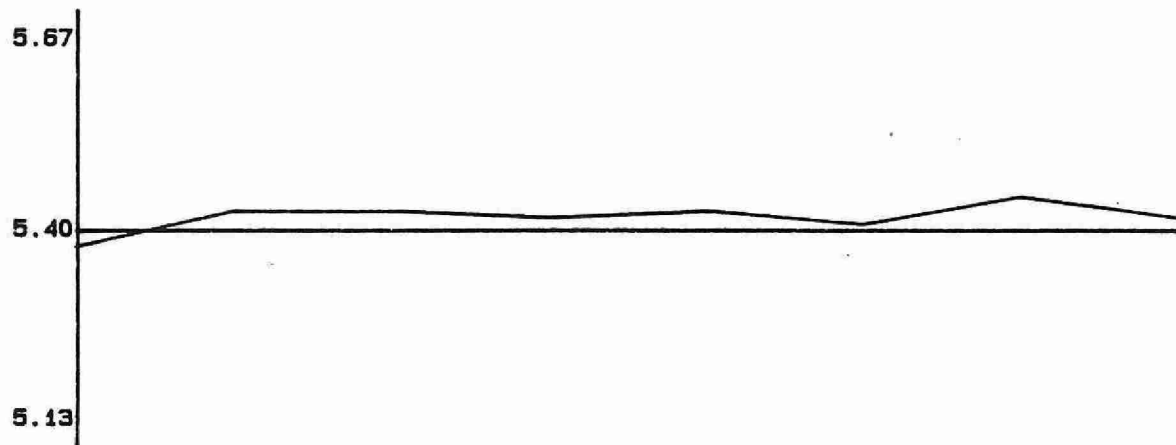
QUALITY CONTROL GRAPHS

PH - SOIL (XW)

FROM: 05/06/87
TO: 11/08/87

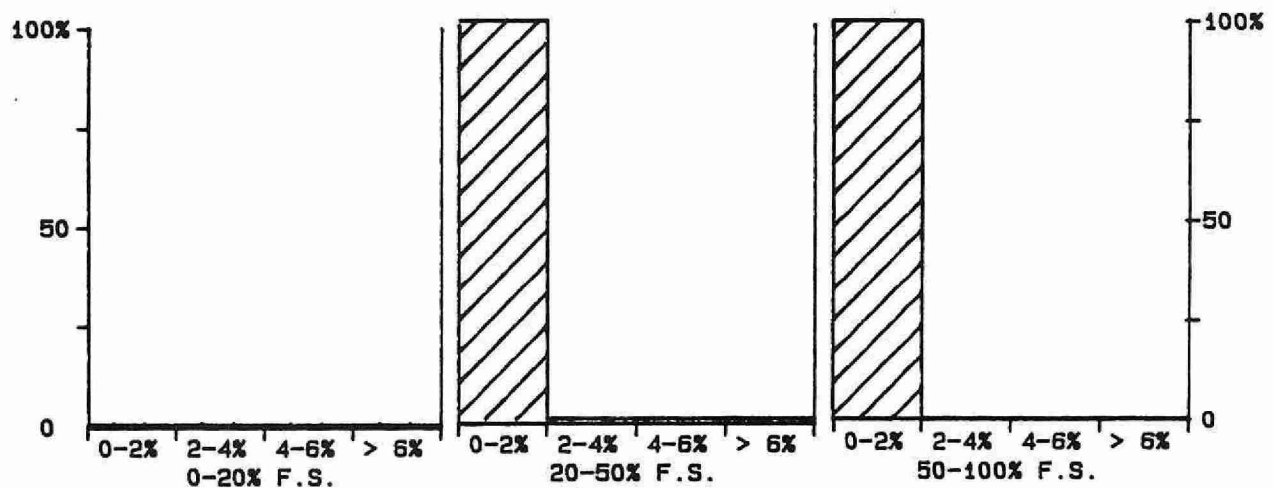


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

— EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

PH - SOIL (X_w)
 QUALITY CONTROL DATA FROM 24/09/87 TO 02/12/87

Lab: Dorset Soils

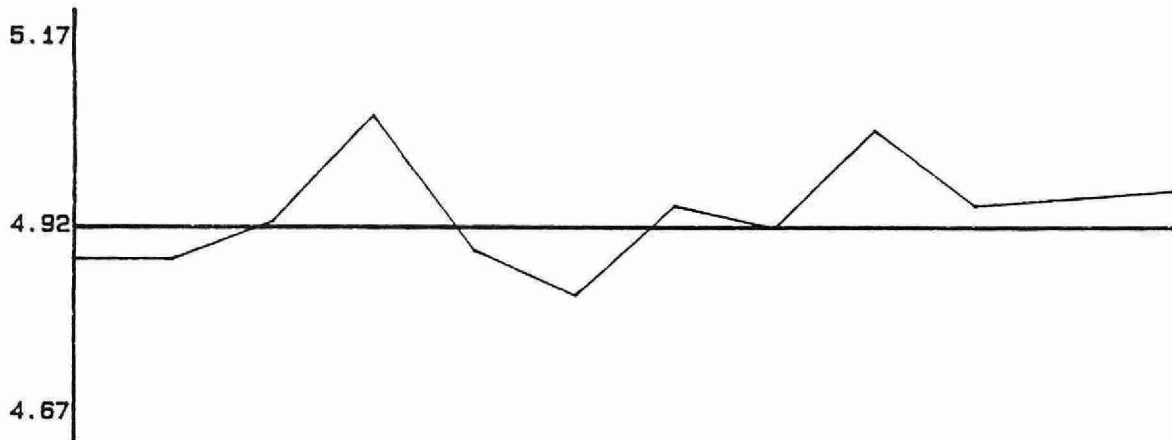
Analytical Range: 0.04 to 9.00

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	12	4.92	4.93	0.069
r2 :	12	5.40	5.42	0.027

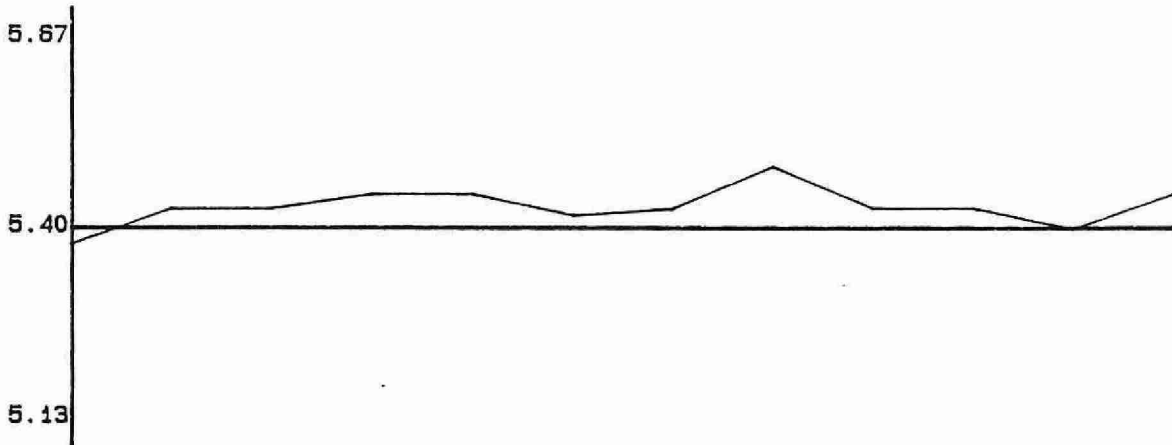
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	5	3.00 - 5.00	0.008	0.1
	16	5.00 - 7.00	0.055	0.9
	3	7.00 - 9.00	0.043	0.4
	24	Overall	0.047	N/A

QUALITY CONTROL GRAPHS PH - SOIL (XW)

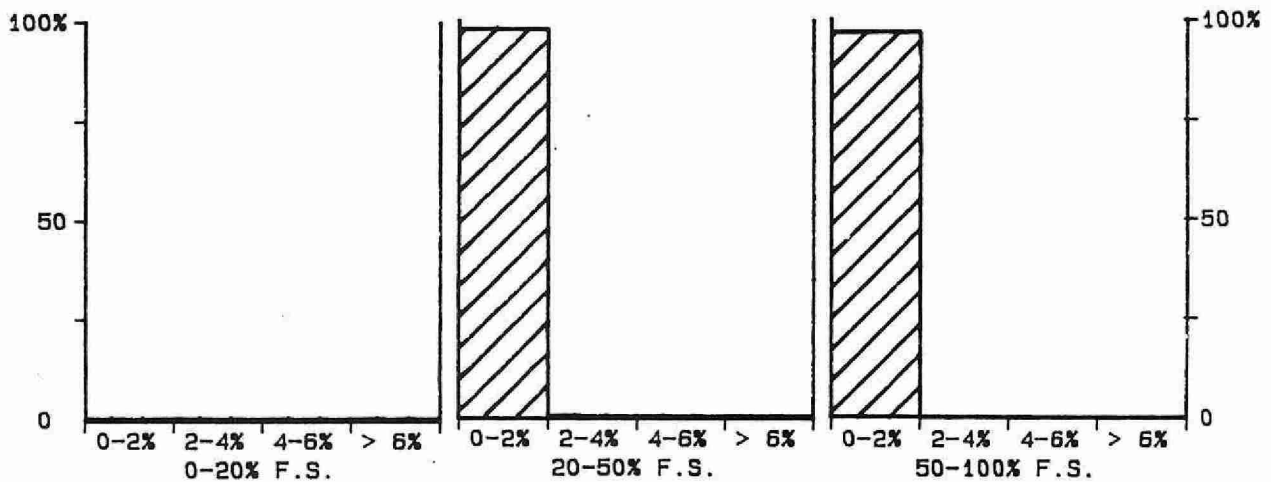
FROM: 24/09/87
TO: 02/12/87



RECOVERY SAMPLE R2



--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10

***** PHENOLICS - REACTIVE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: PHNOL	Units	: ug/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Effluents, Domestic Water Supplies		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass
Preservative	: Copper sulphate-phosphoric acid
Other	: Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.
Approximate absorbance: 0.03 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, standard, BL every 10 samples

NOTES:

A report identifying reactive phenolics is available on request.

PHENOLICS - REACTIVE
QUALITY CONTROL DATA FROM 07/01/87 TO 30/12/87

Lab: Colourimetry

Analytical Range: 1.6 to 50.0 ug/L as PHENOL

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	90	40.0	39.9	-0.1	0.47
b :	90	10.0	10.3	0.3	0.20
a+b :	90	50.0	50.2	0.2	0.56
a-b :	90	30.0	29.5	-0.5	0.45

s.d.(AB): Sw(within run): 0.32 S(between runs): 0.36 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.9 to 52.1 for A+B
 28.6 to 31.4 for A-B

DUPLICATES:

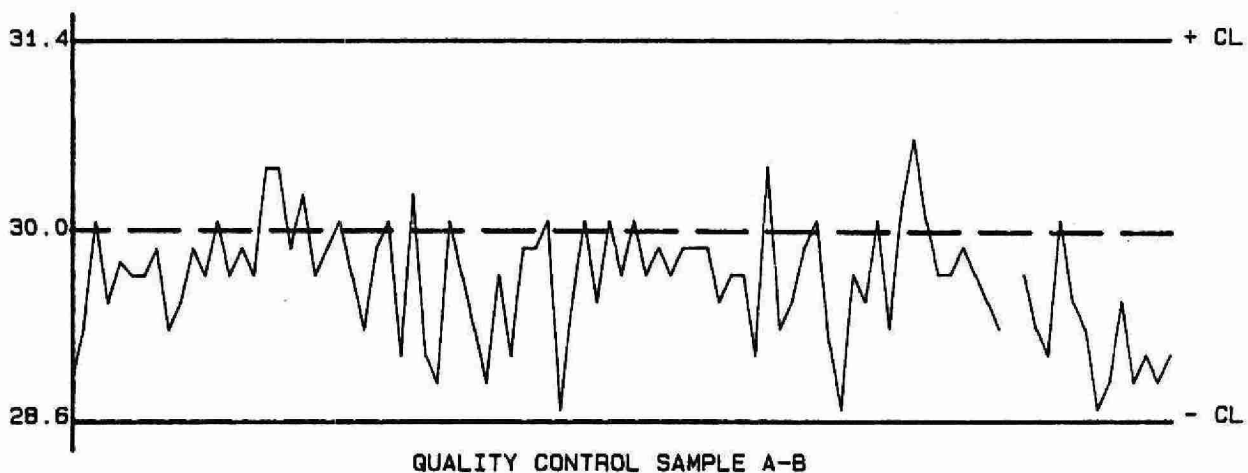
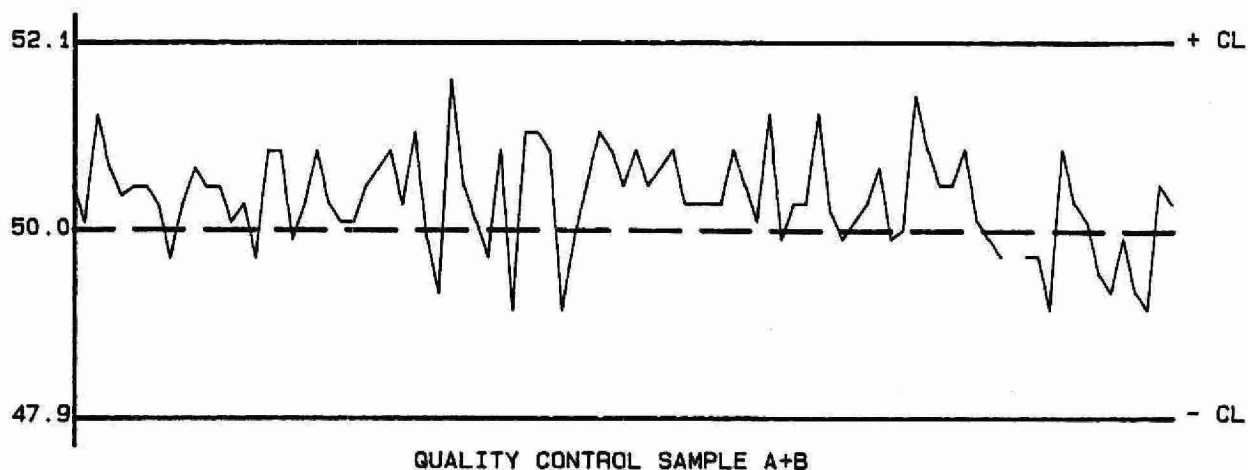
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
172	0.0 - 5.0	0.33	36.2
15	5.0 - 10.0	0.46	6.1
9	10.0 - 25.0	2.00	11.4
5	25.0 - 50.0	0.60	1.8
201	Overall	0.55	N/A

OTHER CHECKS:

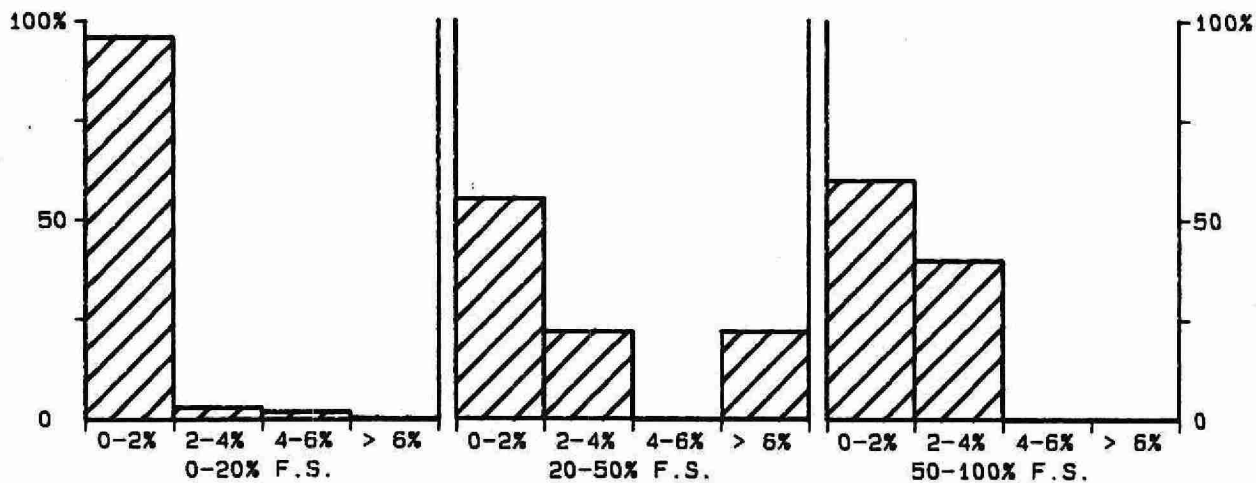
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	90	0.3	0.13

QUALITY CONTROL GRAPHS PHENOLICS - REACTIVE (UG/L AS PHENOL)

FROM: 07/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/L AS PHENOL

***** PHOSPHORUS -REACTIVE ORTHOPHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent. Approximate absorbance: 0.2 at the full scale level.
N.B. Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.0005 T value: 0.0025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/02/85 -Sample filtration was eliminated for all sample classes but Great Lakes (G). Reduction period was reduced from 4 to 2 min. to lessen danger of polyphosphate conversion to orthophosphate during analysis.
15/05/84 -Commodore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.
01/10/84 -Sample filtration was eliminated fro Great Lakes (G) samples.
12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

PHOSPHORUS - REACTIVE ORTHOPHOSPHATE
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: N/A to 0.1250 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	157	0.1000	0.0999	-0.0001	0.00163
b :	157	0.0250	0.0249	-0.0001	0.00126
a+b :	157	0.1250	0.1248	-0.0002	0.00231
a-b :	157	0.0750	0.0750	0.0000	0.00178
c :	157	0.0250	0.0249	-0.0001	0.00126
d :	157	0.0125	0.0121	-0.0004	0.00076
c+d :	157	0.0375	0.0370	-0.0005	0.00194
c-d :	157	0.0125	0.0128	0.0003	0.00075

s.d.(AB): Sw(within run): 0.00126 S(between runs): 0.00146 S/Sw: 1.16
s.d.(CD): Sw(within run): 0.00053 S(between runs): 0.00104 S/Sw: 1.96

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.1175 to 0.1325 for A+B
0.0700 to 0.0800 for A-B
0.0330 to 0.0420 for C+D
0.0095 to 0.0155 for C-D

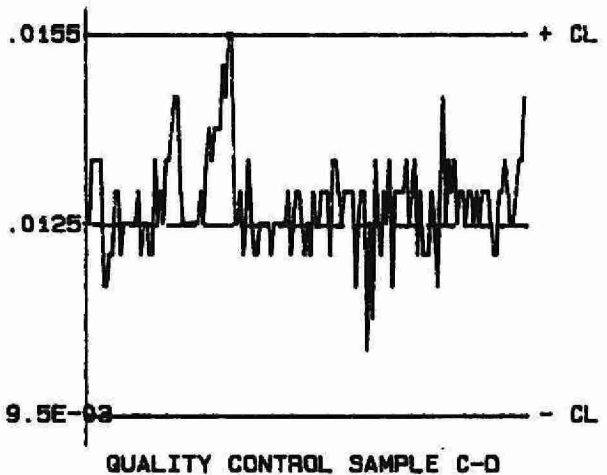
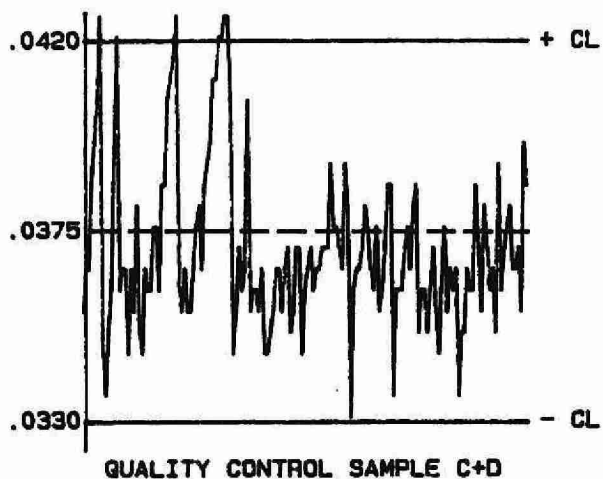
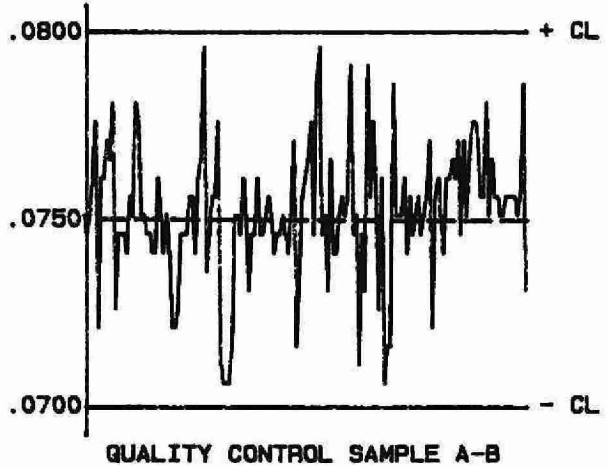
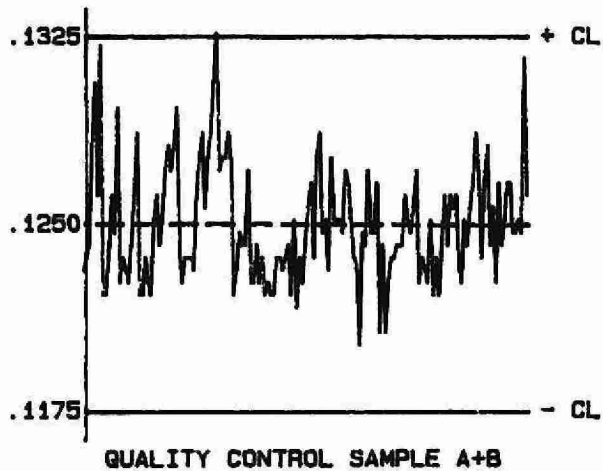
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	0	0.0000 - 0.0100	N/A	N/A
	53	0.0100 - 0.0200	0.0011	7.9
	73	0.0200 - 0.0500	0.0010	3.2
	41	0.0500 - 0.1250	0.0015	1.7
	167	Overall	0.0012	N/A

OTHER CHECKS:

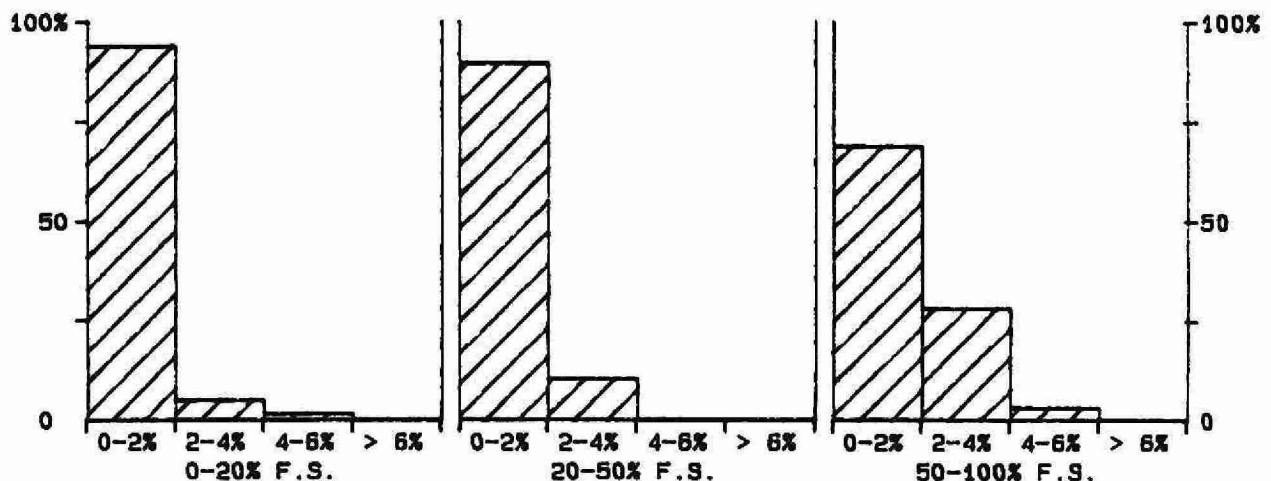
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	156	0.7377	0.44200

QUALITY CONTROL GRAPHS PHOSPHORUS - REACTIVE ORTHOPHOSPHATE (MG/L AS P)

FROM: 06/01/87
 TO: 23/12/87



--- EXPECTED VALUE
 --- CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



***** PHOSPHORUS - REACTIVE ORTHOPHOSPHATE *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required : 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent. Approximate absorbance: 0.5 at the full scale level.
N.B. Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using UV sensitive phototube.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

02/07/85 -Sample filtration was eliminated for all sample classes.
18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic using 6 standards instead of 2.

PHOSPHORUS - REACTIVE ORTHOPHOSPHATE
QUALITY CONTROL DATA FROM 06/01/87 TO 29/01/88

Lab: Colourimetry

Analytical Range: 0.18 to 10.00 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	195	7.00	7.05	0.05	0.088
b :	195	3.50	3.52	0.02	0.051
a+b :	195	10.50	10.57	0.07	0.121
a-b :	195	3.50	3.53	0.03	0.077
c :	195	3.50	3.52	0.02	0.051
d :	195	0.70	0.68	-0.02	0.033
c+d :	195	4.20	4.20	0.00	0.074
c-d :	195	2.80	2.84	0.04	0.043

s.d.(AB): Sw(within run): 0.054 S(between runs): 0.072 S/Sw: 1.32
s.d.(CD): Sw(within run): 0.030 S(between runs): 0.043 S/Sw: 1.41

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.05 to 10.95 for A+B
3.20 to 3.80 for A-B
4.02 to 4.38 for C+D
2.68 to 2.92 for C-D

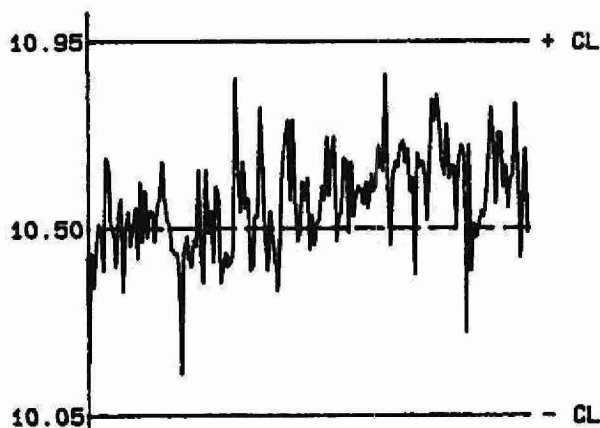
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	412	0.00 - 0.40	0.036	35.6
	46	0.40 - 1.00	0.085	13.3
	27	1.00 - 2.00	0.093	6.2
	24	2.00 - 4.00	0.083	2.8
	16	4.00 - 10.00	0.133	2.2
	525	Overall	0.054	N/A

OTHER CHECKS:

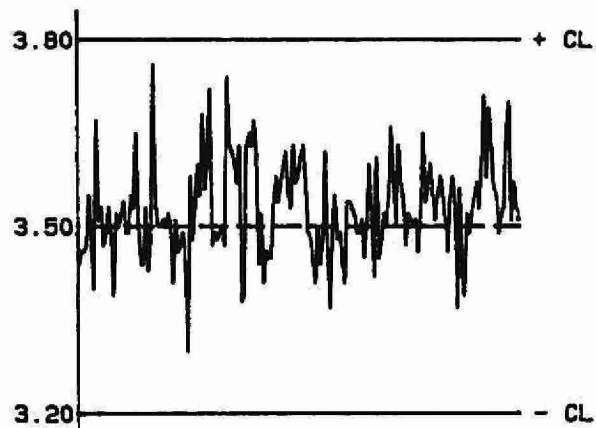
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
Long Term Blank :	59	0.01	0.011

QUALITY CONTROL GRAPHS PHOSPHORUS - REACTIVE ORTHOPHOSPHATE (MG/L AS P)

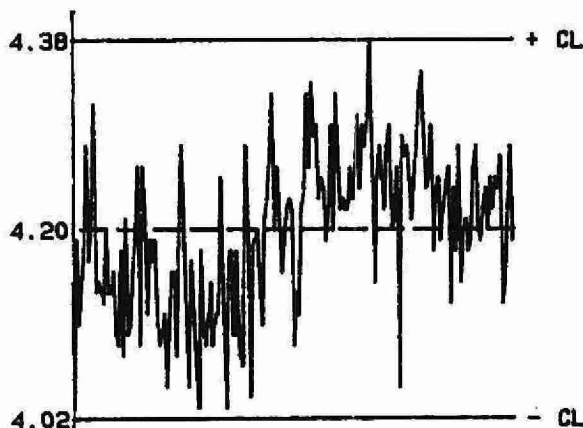
FROM: 06/01/87
 TO: 24/12/87



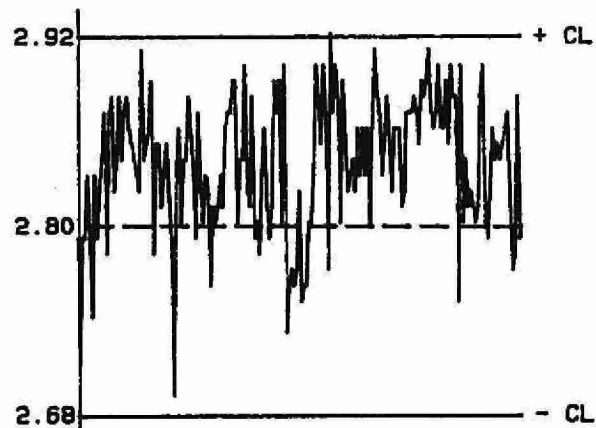
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

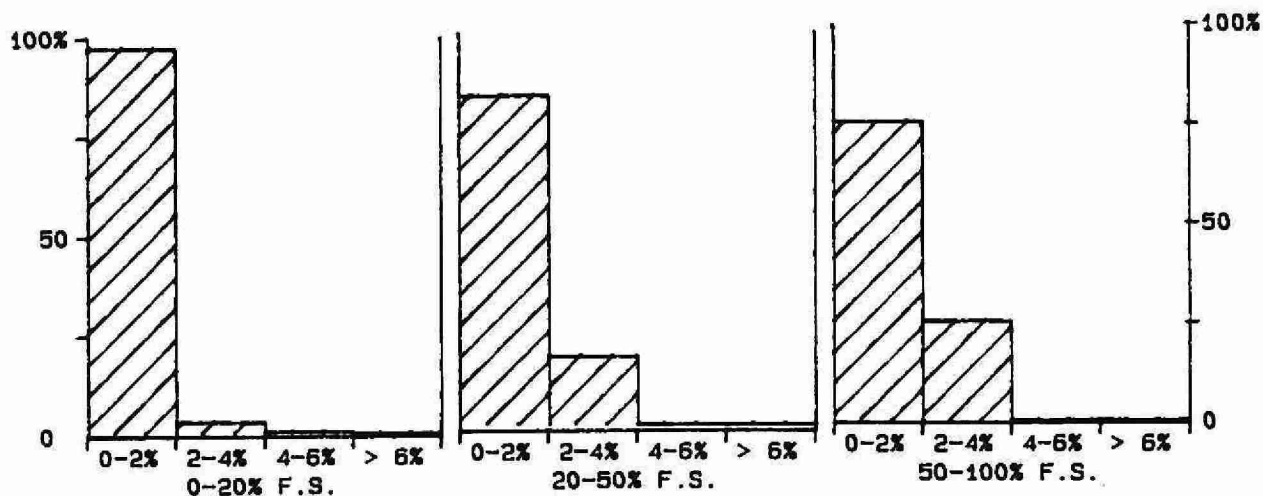


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
 — CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 10 MG/L AS P

***** PHOSPHORUS - TOTAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.4 at the full scale level.

N.B. Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
- Data capture, reduction, and processing via a multi-tube microcomputer system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1

Drift : BL every 10 samples; BL plus undigested standard every 20 samples

MODIFICATIONS:

15/08/83 -Commodore PET microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic.

26/02/86 -HP9920 microcomputer replaced Commodore PET.

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

PHOSPHORUS-TOTAL
QUALITY CONTROL DATA FROM 06/01/87 TO 24/12/87

Lab: Colourimetry

Analytical Range: 0.012 to 0.200 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	174	0.150	0.150	-0.000	0.0019
b :	174	0.050	0.049	-0.001	0.0015
a+b :	174	0.200	0.199	-0.001	0.0029
a-b :	174	0.100	0.101	0.001	0.0019

s.d.(AB): Sw(within run): 0.0013 S(between runs): 0.0017 S/Sw: 1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.191 to 0.209 for A+B
0.094 to 0.106 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	134	0.140	0.135	0.0034
r2 :	144	0.084	0.080	0.003
r3 :	160	0.028	0.026	0.0023

DUPLICATES:

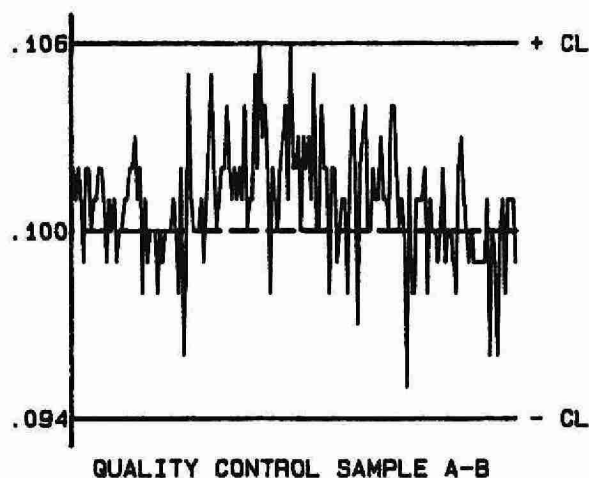
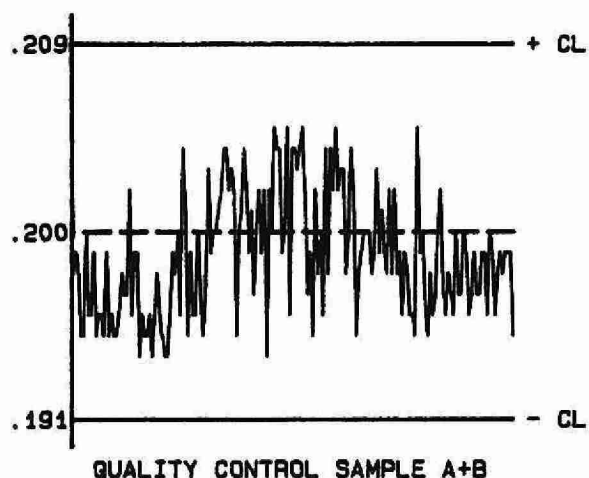
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
116	0.000 - 0.020	0.0023	16.3
89	0.020 - 0.050	0.0029	9.4
36	0.050 - 0.100	0.0033	5.0
15	0.100 - 0.200	0.003	2.1
256	Overall	0.0027	N/A

OTHER CHECKS:

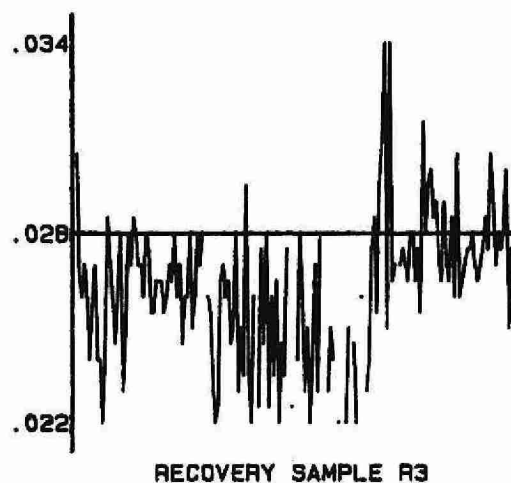
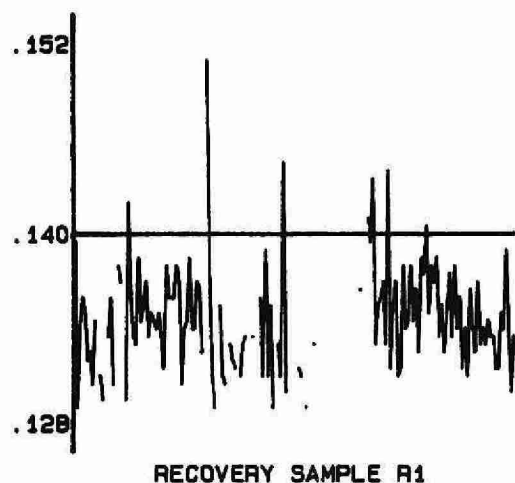
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	158	0.450	0.4999
Digested Blank :	171	0.703	0.4604

QUALITY CONTROL GRAPHS PHOSPHORUS-TOTAL (MG/L AS P)

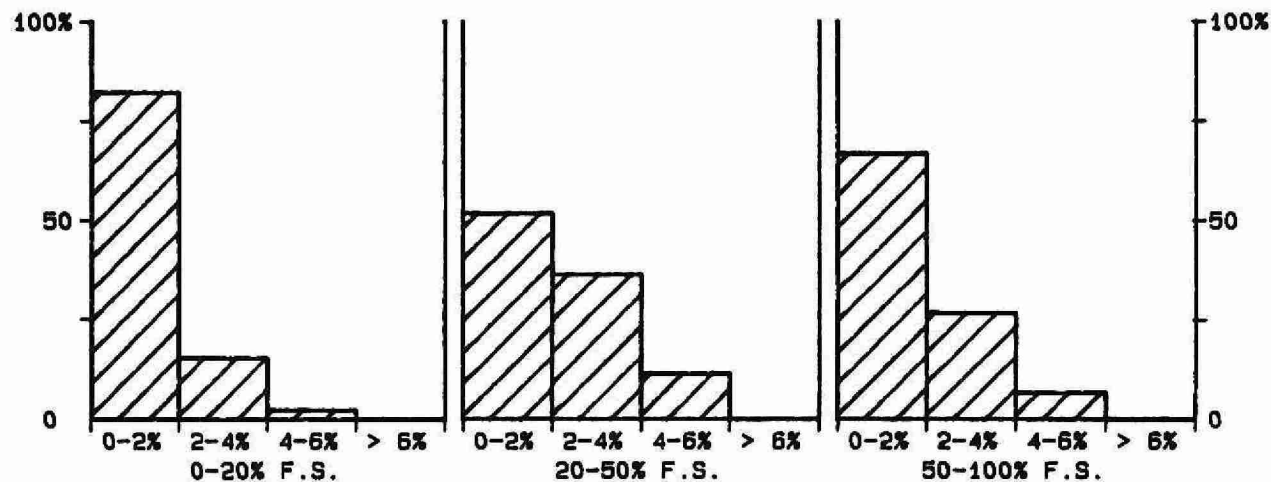
FROM: 06/01/87
TO: 24/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .2 MG/L AS P

***** PHOSPHORUS - TOTAL *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: STKNP	Unit Code	: 064815
Method Code	: 504BC2	Supervisor	: M. Rawlings
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

N.B. Total Kjeldahl Nitrogen is determined simultaneously.

INSTRUMENTATION:

- Block digesters (2)
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using a UV sensitive phototube.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/10/85 -Higher range selected, full scale changed from 2 to 5 mg/L as P. New calibration controls added. Calibration control results collected before high range was implemented are included in plot.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic using 6 standards instead of 2.

NOTES:

System is calibrated with undigested standards.

**Minimum dilution is 50% (i.e. factor of two). Therefore, minimum increment and detection criterion are actually twice that listed.

PHOSPHORUS - TOTAL
QUALITY CONTROL DATA FROM 05/01/87 TO 29/01/88

Lab: Colourimetry

Analytical Range: 0.063 to 5.00 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	181	3.50	3.51	0.01	0.023
b :	181	1.40	1.40	0.00	0.014
a+b :	181	4.90	4.91	0.01	0.031
a-b :	181	2.10	2.11	0.01	0.021
c :	181	1.400	1.401	0.001	0.0136
d :	181	0.280	0.273	-0.007	0.0077
c+d :	181	1.680	1.674	-0.006	0.0179
c-d :	181	1.120	1.128	0.008	0.0130

s.d.(AB): Sw(within run): 0.015 S(between runs): 0.019 S/Sw: 1.28
s.d.(CD): Sw(within run): 0.0092 S(between runs): 0.0111 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.67 to 5.12 for A+B
1.95 to 2.25 for A-B
1.590 to 1.770 for C+D
1.060 to 1.180 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	180	3.50	3.45	0.050
r2 :	175	1.40	1.38	0.026
r3 :	177	0.700	0.675	0.0245

DUPLICATES:

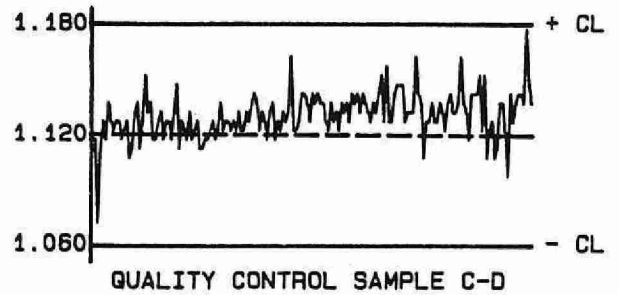
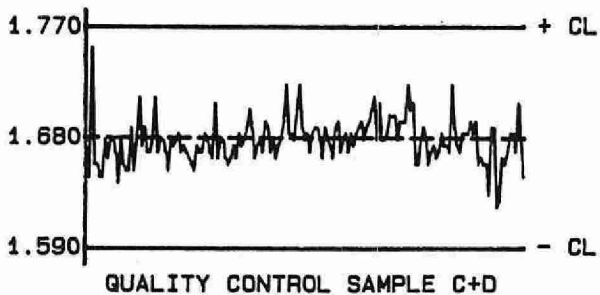
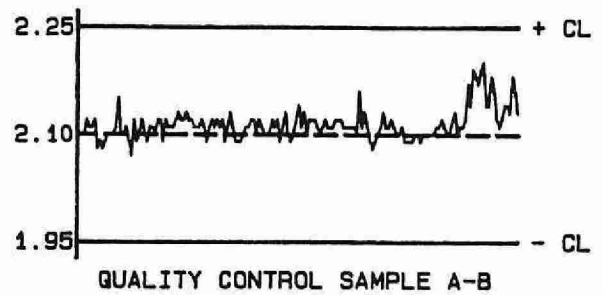
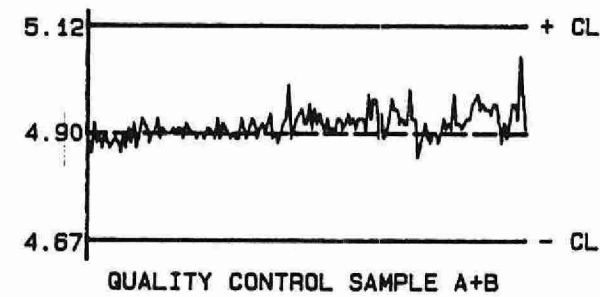
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
178		0.000 - 0.200	0.0127	21.1
80		0.200 - 0.400	0.0264	9.0
138		0.40 - 1.00	0.050	7.5
63		1.00 - 2.00	0.051	3.7
64		2.00 - 5.00	0.063	1.9
523		Overall	0.040	N/A

OTHER CHECKS:

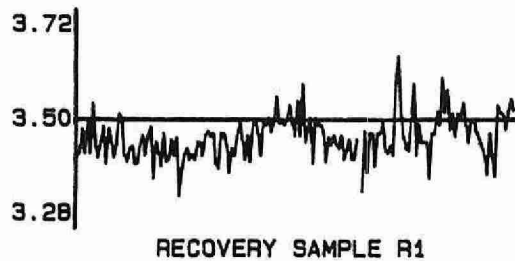
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	0	N/A	N/A
Long Term Blank :	36	0.174	0.3769
Digested Blank :	177	0.014	0.0075

QUALITY CONTROL GRAPHS PHOSPHORUS - TOTAL (MG/L AS P)

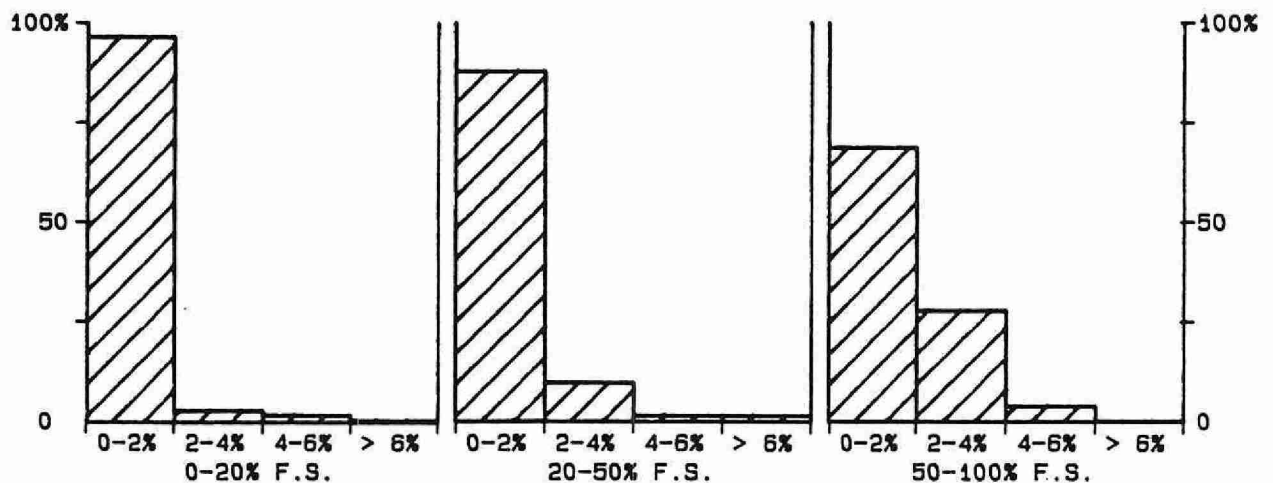
FROM: 05/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



***** PHOSPHORUS - TOTAL *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 22/03/79
LIS Test Name Code	: PPUT1	Units	: ug/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5926C2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 35 mL
Container	: Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121°C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-anti-monyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.2	T value: 1
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CALIBRATION:

BL plus 2 undigested standards

CONTROLS:

Calibration	: LTBL plus 4 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 4 digested standards, e.g. R1
Drift	: BL every 10 samples and BL plus 2 undigested standards every 25 samples

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

PHOSPHOROUS - TOTAL
QUALITY CONTROL DATA FROM 02/01/87 TO 24/12/87

Lab: Dorset

Analytical Range: 1.7 to 200 ug/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	103	171	172	1	3.9
b :	103	57	58	1	1.4
a+b :	103	228	229	1	5.1
a-b :	103	114	114	0	2.9
c :	103	17.1	17.0	-0.1	0.38
d :	103	5.7	5.6	-0.1	0.21
c+d :	103	22.8	22.6	-0.2	0.55
c-d :	103	11.4	11.3	-0.1	0.27

s.d.(AB): Sw(within run): 2.1 S(between runs): 2.9 S/Sw: 1.43
s.d.(CD): Sw(within run): 0.19 S(between runs): 0.31 S/Sw: 1.61

On any given day the calibration is accepted if the values obtained lie within the ranges:

219 to 237 for A+B
108 to 120 for A-B
19.8 to 25.8 for C+D
9.4 to 13.4 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	102	140	144	4.9
r2 :	101	70	72	4.7
r3 :	102	14.0	16.1	14.44
r4 :	102	7.0	8.5	10.24

DUPLICATES:

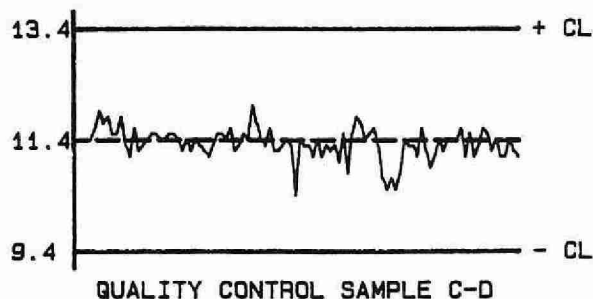
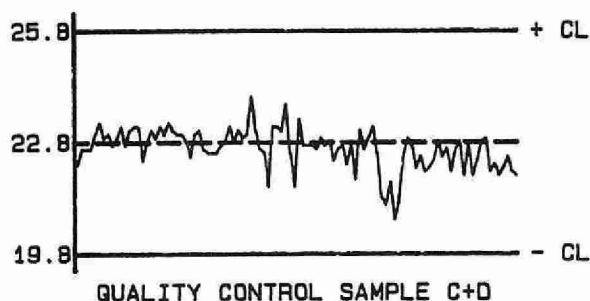
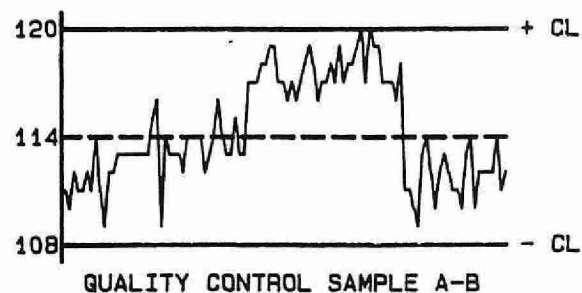
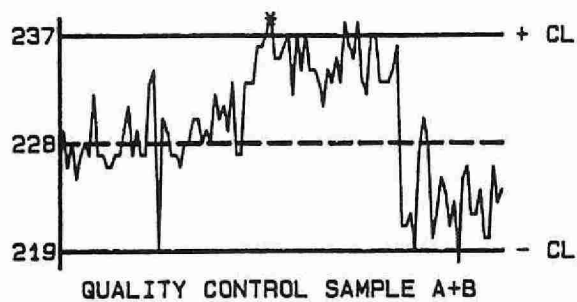
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	71	0.0 - 5.0	0.33	10.3
	86	5.0 - 10.0	0.35	4.7
	67	10.0 - 20.0	0.30	6.4
	62	20 - 50	1.5	4.5
	17	50 - 200	5.1	6.3
	303	Overall	1.5	N/A

OTHER CHECKS:

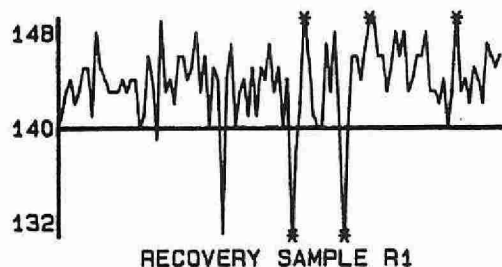
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal.	103	602	19.7
Long Term Blank	103	0.1	0.23
Digested Blank	102	0.9	0.33

QUALITY CONTROL GRAPHS PHOSPHOROUS - TOTAL (UG/L AS P)

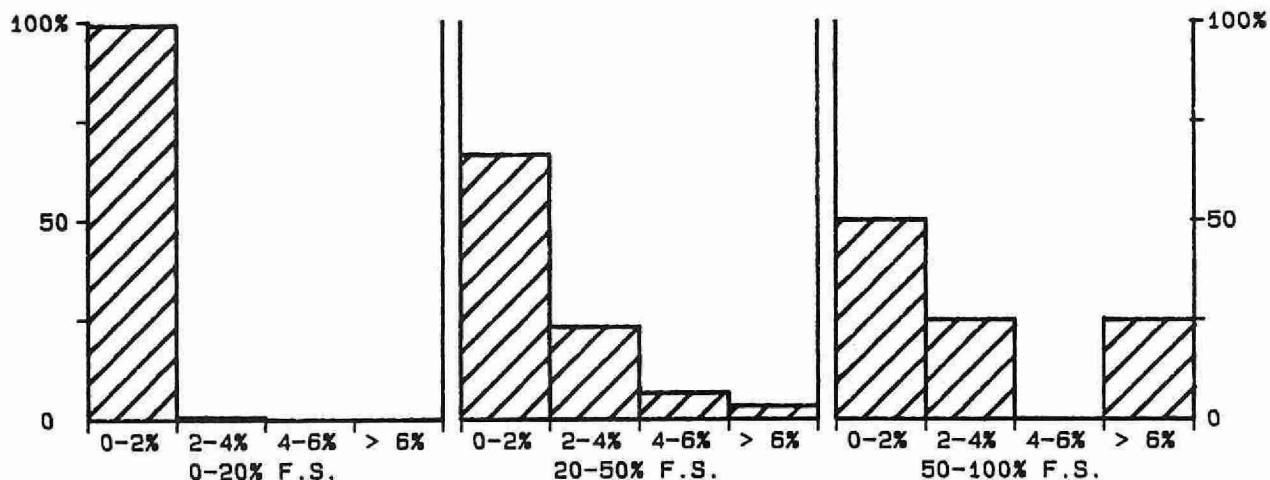
FROM: 02/01/87
TO: 24/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 UG/L AS P

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAA	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required : 5 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

POTASSIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Atomic Absorption

Analytical Range: 0.023 to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	71	0.600	0.598	-0.002	0.0095
b :	71	0.100	0.100	-0.000	0.0067
a+b :	71	0.700	0.697	-0.003	0.0130
a-b :	71	0.500	0.498	-0.002	0.0100

s.d.(AB): Sw(within run): 0.0071 S(between runs): 0.0082 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

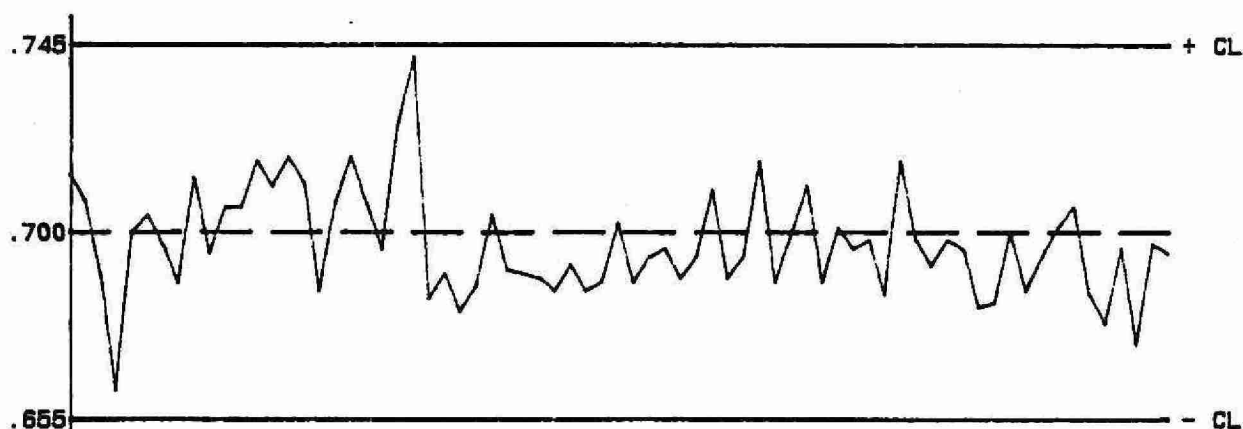
0.655 to 0.745 for A+B
0.470 to 0.530 for A-B

DUPLICATES:

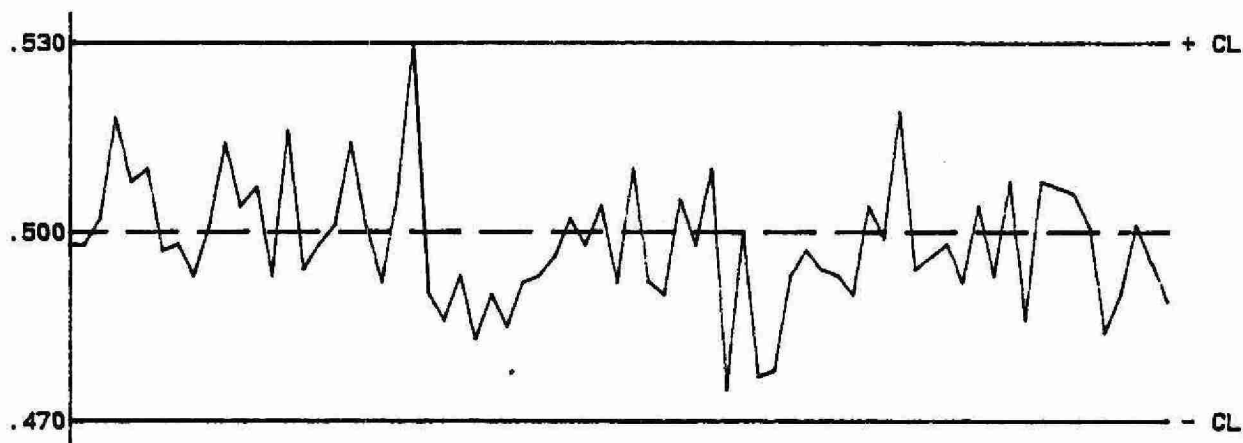
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
108	0.000 - 0.100	0.0046	12.1
21	0.100 - 0.200	0.0073	5.3
35	0.20 - 1.00	0.395	85.3
164	Overall	0.182	N/A

QUALITY CONTROL GRAPHS POTASSIUM (MG/L AS K)

FROM: 06/01/87
TO: 23/12/87

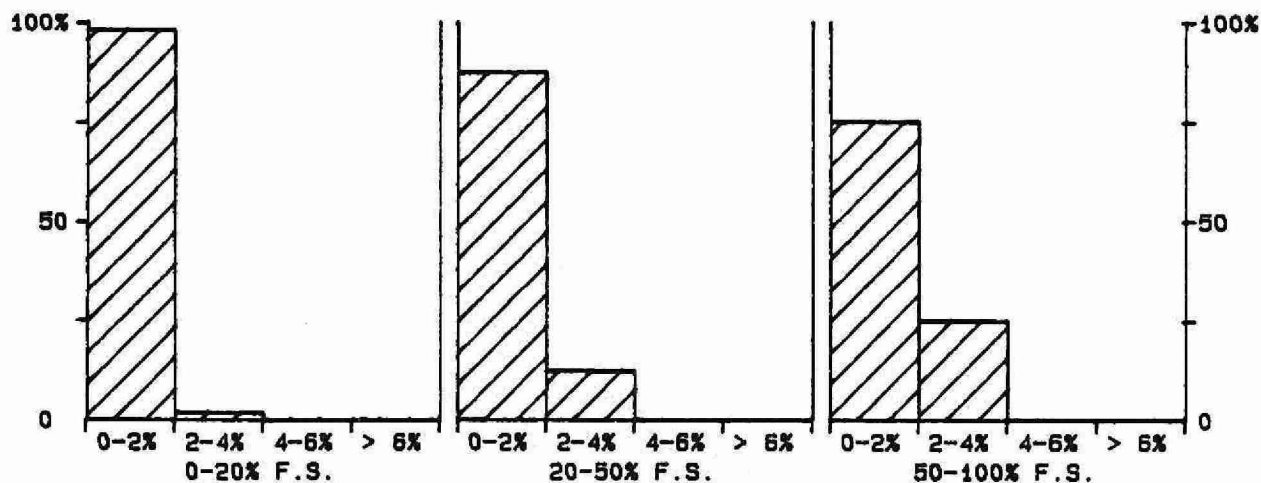


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS K

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: RMAAS	Unit Code	: 064819
Method Code	: 0905A1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 768.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.10 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 5.00 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMNAKH) was increased from 5.00 to 10.0 mg/L full scale.
Calibration technique was changed from quadratic to linear interpolation. Sodium is no longer determined simultaneously.
25/09/85 -Calibration range stayed at 10.0 mg/L but second analytical range was dropped.
Concentration of QC solutions were adjusted accordingly. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 1.00, 10.0, and 10.0 mg/L as K full scale.
06/04/87 -Changed full scale to 5 mg/L as K
Number of cal.standards changed from 10 rto 11
Number of QC standards changed from 2 to 3 plus LTB

POTASSIUM
QUALITY CONTROL DATA FROM 05/01/87 TO 02/04/87

Lab: Atomic Absorption

Analytical Range: 0.11 to 10.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	8.00	8.03	0.03	0.095
b :	25	0.70	0.70	-0.00	0.018
a+b :	25	8.70	8.73	0.03	0.098
a-b :	25	7.30	7.34	0.04	0.095

s.d.(AB): Sw(within run): 0.067 S(between runs): 0.068 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.25 to 9.15 for A+B
 7.00 to 7.60 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	42	0.00 - 0.50	0.022	8.3
	10	0.50 - 1.00	0.015	2.2
	11	1.00 - 2.00	0.051	3.5
	4	2.00 - 5.00	0.087	3.1
	0	5.00 - 10.00	N/A	N/A
	67	Overall	0.035	N/A.

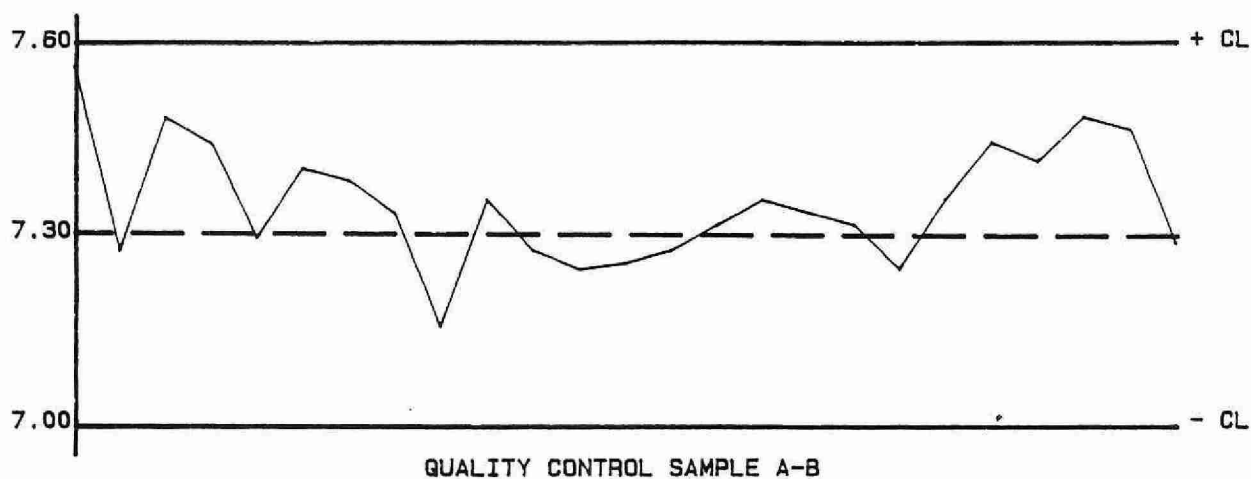
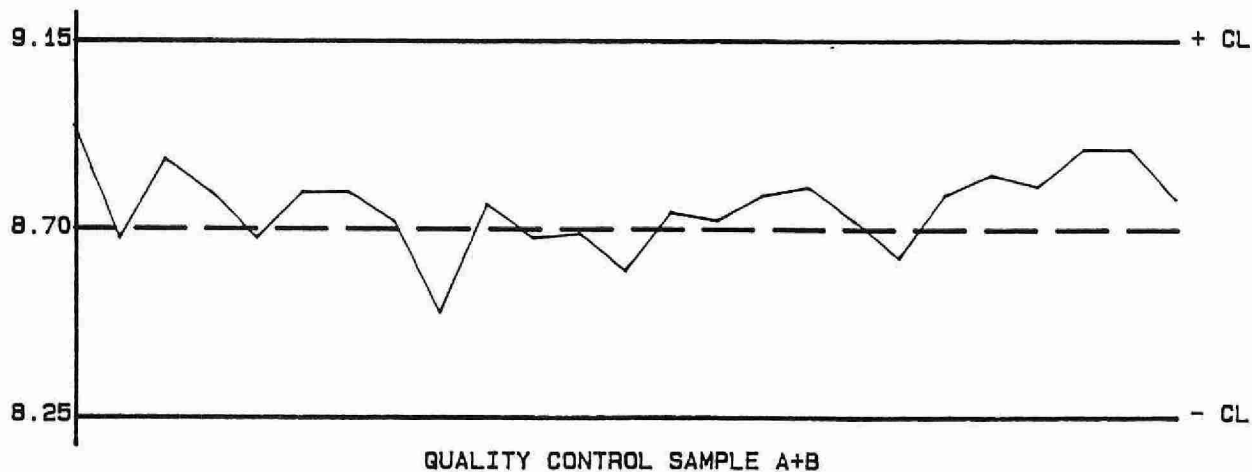
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	25	1.101	0.0955
Long Term Blank :	25	0.00	0.020

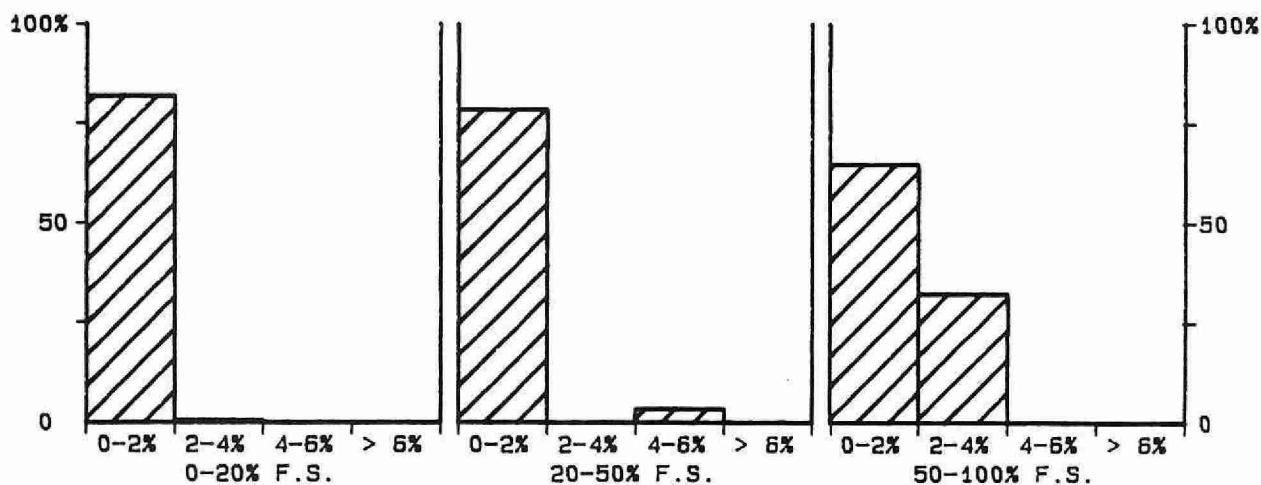
QUALITY CONTROL GRAPHS

POTASSIUM (MG/L AS K)

FROM: 05/01/87
TO: 02/04/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



POTASSIUM
QUALITY CONTROL DATA FROM 06/04/87 TO 31/12/87

Lab: Atomic Absorption

Analytical Range: 0.05 to 5.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	96	4.00	3.98	-0.02	0.035
b :	96	1.00	0.99	-0.01	0.017
a+b :	96	5.00	4.97	-0.03	0.045
a-b :	96	3.00	2.99	-0.01	0.032
c :	95	1.000	0.993	-0.007	0.0165
d :	95	0.250	0.252	0.002	0.0143
c+d :	95	1.250	1.245	-0.005	0.0250
c-d :	95	0.750	0.741	-0.009	0.0180

s.d.(AB): Sw(within run): 0.023 S(between runs): 0.028 S/Sw: 1.22
s.d.(CD): Sw(within run): 0.0127 S(between runs): 0.0154 S/Sw: 1.21

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.77 to 5.23 for A+B
2.85 to 3.15 for A-B
1.175 to 1.325 for C+D
0.700 to 0.800 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	30	0.00 - 0.25	0.011	7.2
	72	0.25 - 0.50	0.013	3.5
	62	0.50 - 1.00	0.044	6.2
	96	1.00 - 3.00	0.031	1.9
	17	3.00 - 5.00	0.107	2.7
	277	Overall	0.039	N/A

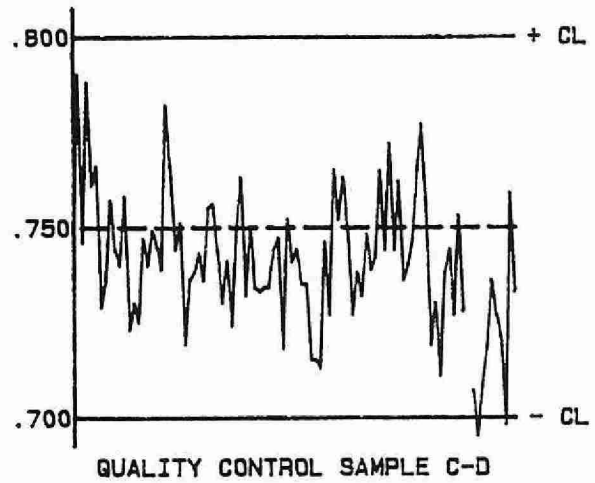
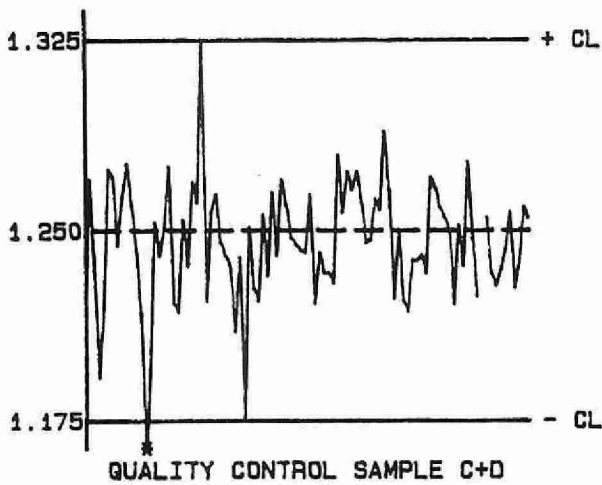
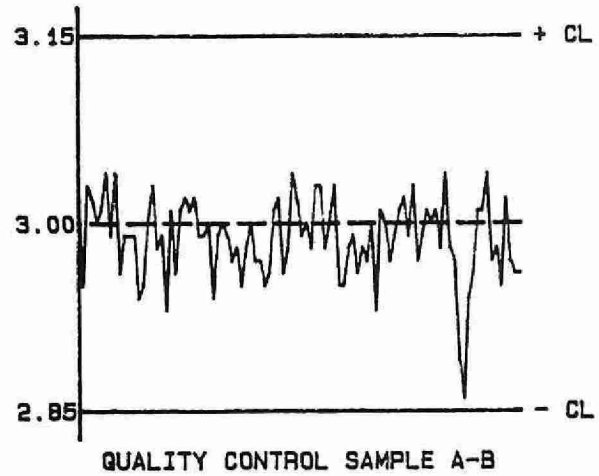
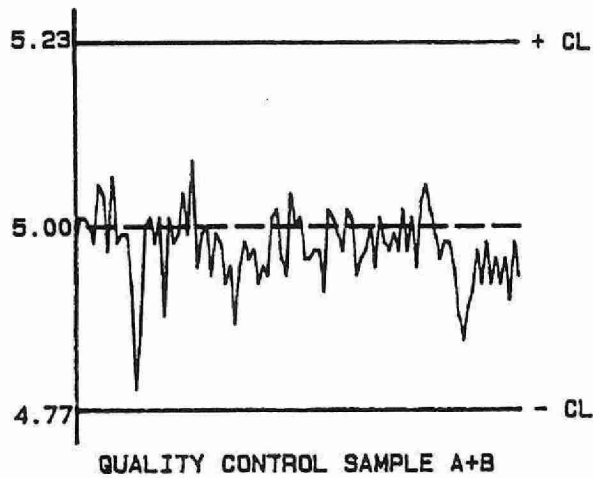
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	95	0.866	0.1391
Long Term Blank :	89	0.00	0.009

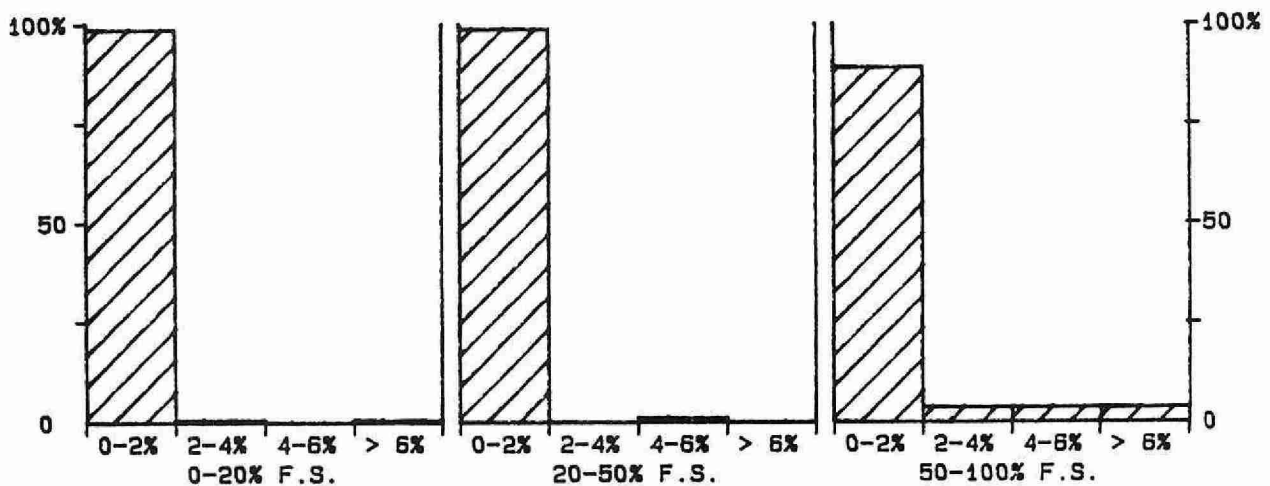
QUALITY CONTROL GRAPHS

POTASSIUM (MG/L AS K)

FROM: 06/04/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS K

***** POTASSIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: WAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage, Industrial wastes		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.1 at full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards and LTB e.g. QCA
Drift : BL every 10 standards; 2 standards every 20 samples

MODIFICATIONS:

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 40 mg/L to 50 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solution adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

03/03/87 -Full scale changed to 25 mg/L as K
Number of cal. standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus LTB

POTASSIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 26/02/87

Lab: Atomic Absorption

Analytical Range: 1.16 to 50.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	14	40.0	39.9	-0.1	0.66
b :	14	3.50	3.44	-0.06	0.125
a+b :	14	43.50	43.33	-0.17	0.651
a-b :	14	36.50	36.45	-0.05	0.691

s.d.(AB): Sw(within run): 0.49 S(between runs): 0.47 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

41.25 to 45.75 for A+B
 35.00 to 38.00 for A-B

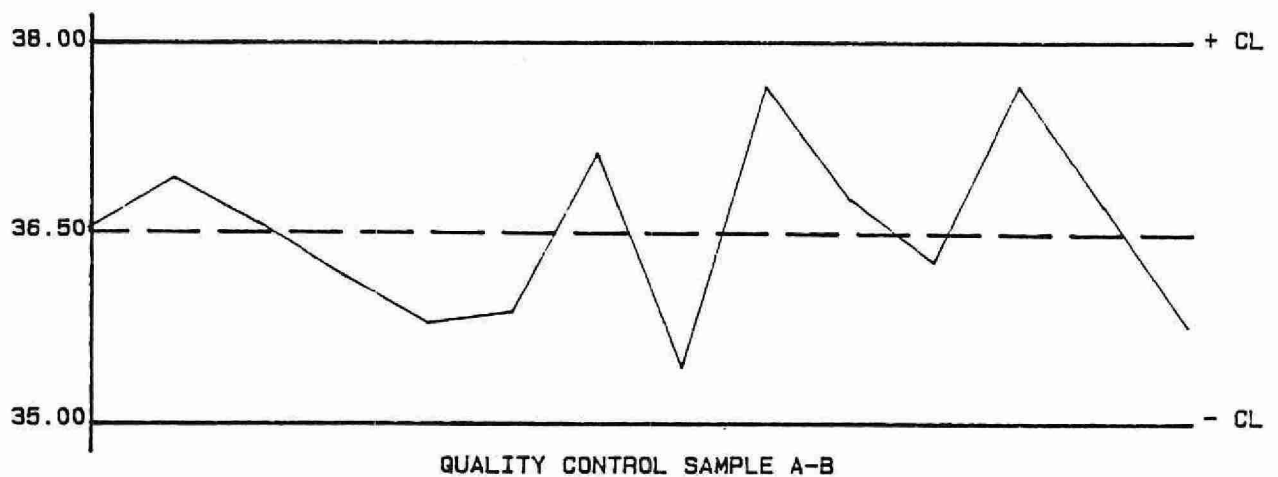
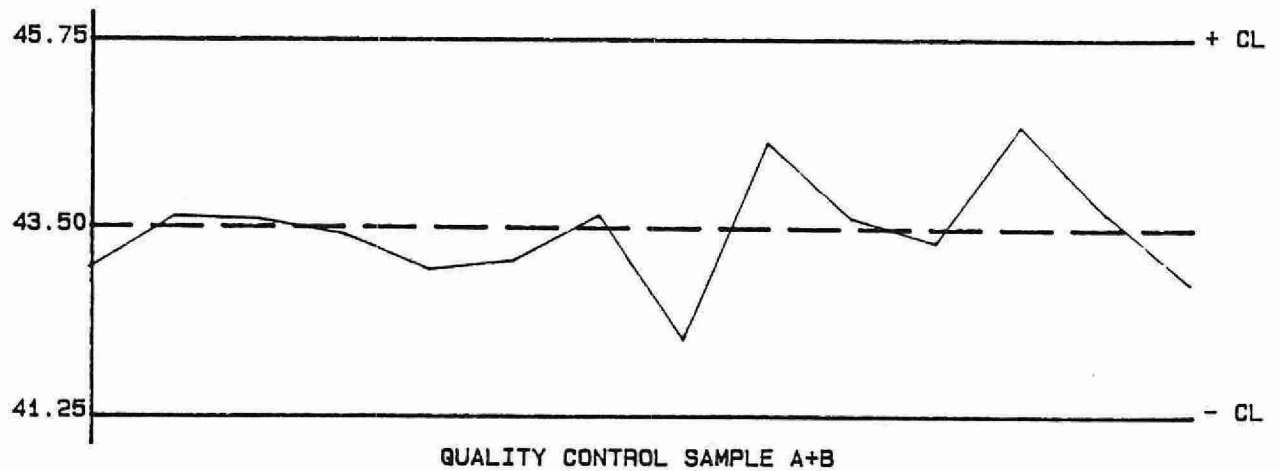
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	32	0.00 - 2.50	0.231	18.9
	3	2.50 - 5.00	0.183	5.6
	0	5.00 - 10.00	N/A	N/A
	0	10.0 - 20.0	N/A	N/A
	1	20.0 - 50.0	N/A	N/A
	36	Overall	0.23	N/A

OTHER CHECKS:

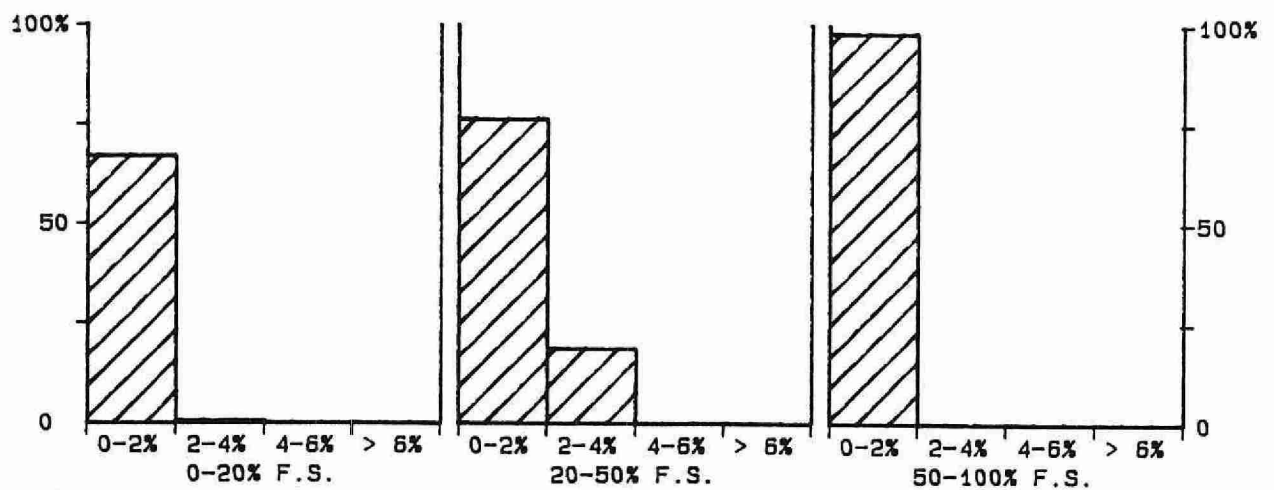
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	13	0.986	0.1528
Long Term Blank :	14	0.03	0.193

QUALITY CONTROL GRAPHS POTASSIUM (MG/L AS K)

FROM: 06/01/87
TO: 26/02/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS K

POTASSIUM
QUALITY CONTROL DATA FROM 05/03/87 TO 31/12/87

Lab: Atomic Absorption

Analytical Range: 0.53 to 25.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	135	20.0	20.0	0.0	0.32
b :	135	5.00	5.00	-0.00	0.112
a+b :	135	25.00	25.03	0.03	0.364
a-b :	135	15.00	15.03	0.03	0.319
c :	135	5.00	4.99	-0.01	0.126
d :	135	1.25	1.27	0.02	0.112
c+d :	135	6.25	6.27	0.02	0.199
c-d :	135	3.75	3.72	-0.03	0.130

s.d.(AB): Sw(within run): 0.23 S(between runs): 0.24 S/Sw: 1.06
s.d.(CD): Sw(within run): 0.092 S(between runs): 0.119 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.80 to 26.20 for A+B
14.20 to 15.80 for A-B
5.65 to 6.85 for C+D
3.35 to 4.15 for C-D

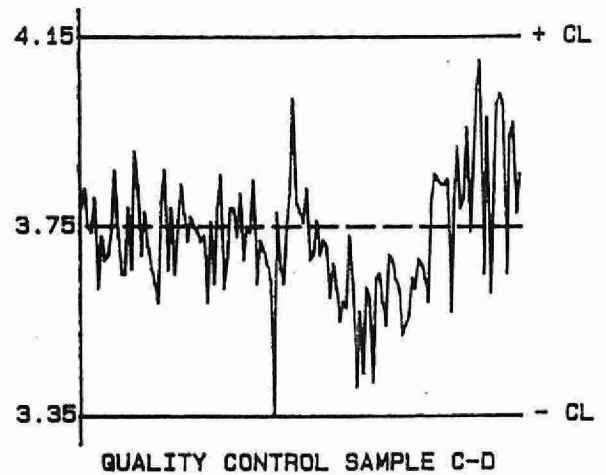
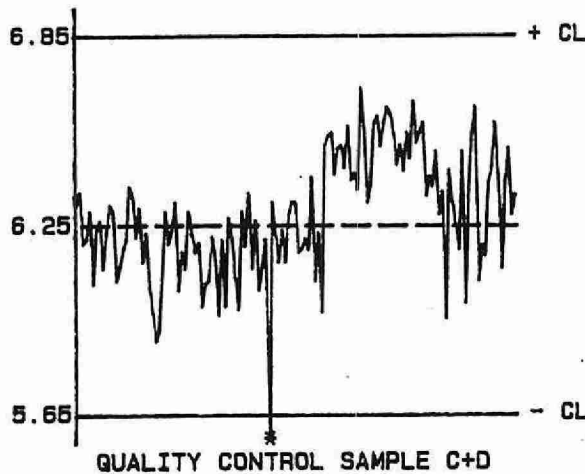
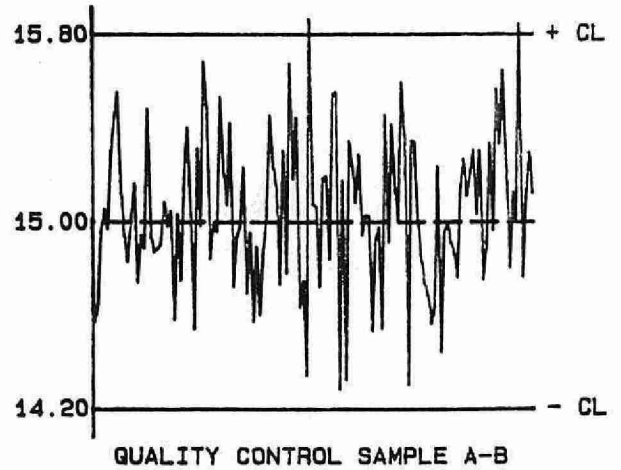
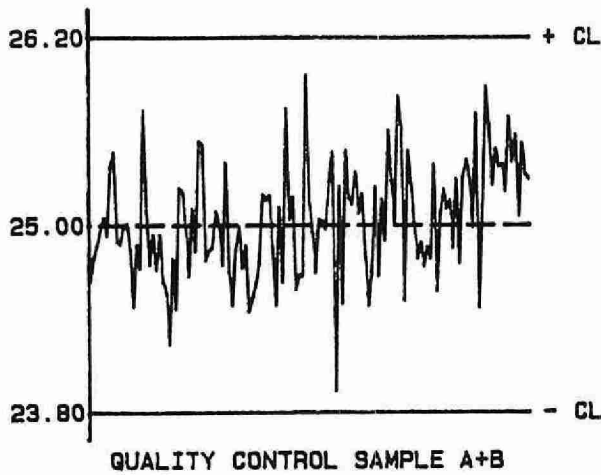
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	138	0.00 - 1.25	0.106	12.0
	126	1.25 - 2.50	0.061	3.5
	62	2.50 - 5.00	0.085	2.4
	25	5.0 - 10.0	0.14	2.1
	16	10.0 - 25.0	0.27	1.7
	367	Overall	0.11	N/A

OTHER CHECKS:

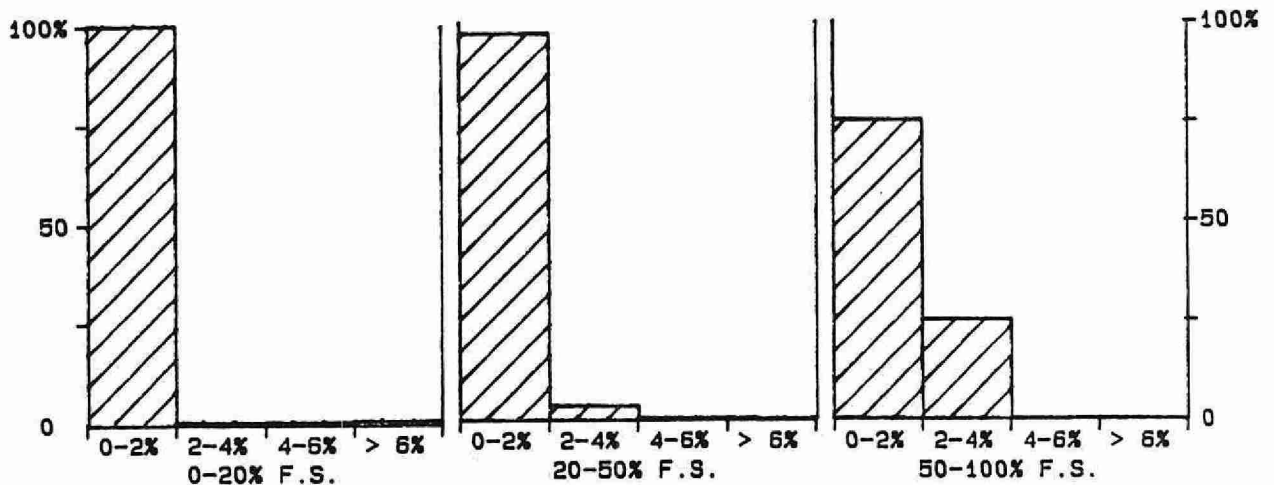
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	132	1.137	0.0866
Long Term Blank :	126	-0.01	0.043

QUALITY CONTROL GRAPHS POTASSIUM (MG/L AS K)

FROM: 05/03/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS K

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: KKUR	Units	: ug/Filter as K
Work Station Code	: PRLOV	Unit Code	: 361819
Method Code	: 004BA3	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS (workstation PRAA) at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Result are converted to ug/filter as K.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

July 81 -Addition of potassium analysis for W40 filters from LoVol filter packs was introduced.
17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of a microcomputer to coordinate sampler, injection, AAS "read", and data reduction. Sample required reduced to 5 mL.

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

TASSIUM - SOIL (Xsc) ***

1.021 10.00
- 0.00 10.00 1.00
* 10.00
* 10.00

Soils Method Introduced: 01/06/80
Units : meq/100 g K
DN Unit Code : 355000
Supervisor : A. Neary

agated and sieved to <2 mm.

1.021 10.00
- 0.00 10.00 1.00
* 10.00
* 10.00

is 30 mL of 2N sodium chloride is agitated for 4
The sample is centrifuged and filtered. The
AAS at 766.5 nm with an air-acetylene flame.
at the full scale level.
magnesium are determined simultaneously.

1.021 10.00

nable sampler changer and Gilson Minipuls II

1.021 10.00

3 Calculated W value: 0.01 T value: 0.05

1.021 10.00

les representing different soil types; 2 method
robin CSSC samples
% F.S.) every 10 samples

1.021 10.00

ed for all soil types (6 g previously used for
uced Perkin Elmer 403

1.021 10.00

C) is calculated as the sum of the sodium
Mg, and K.
known - average value used.

POTASSIUM - SOIL (Xsc)
 QUALITY CONTROL DATA FROM 03/04/87 TO 23/12/87

Lab: Dorset Soils

Analytical Range: 0.04 to

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias
a :	17	0.56	0.55	-0.01
b :	17	0.19	0.17	-0.02
a+b :	17	0.75	0.72	-0.03
a-b :	17	0.38	0.38	0.00

s.d.(AB): Sw(within run): 0.014 S(between runs): 0.014 S/

On any given day the calibration is accepted if the values obtain
 the ranges:

0.66 to 0.84 for A+B
 0.31 to 0.44 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Stand Deviat
r1 :	17	0.10	0.09	0.
r2 :	17	0.47	0.44	0.
r3 :	17	0.04	0.04	0.

DUPLICATES:

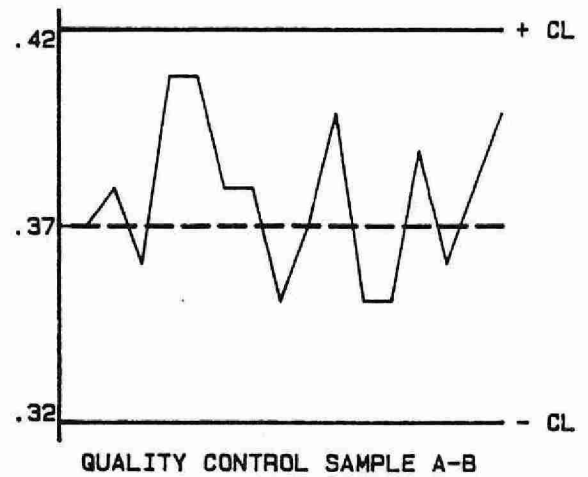
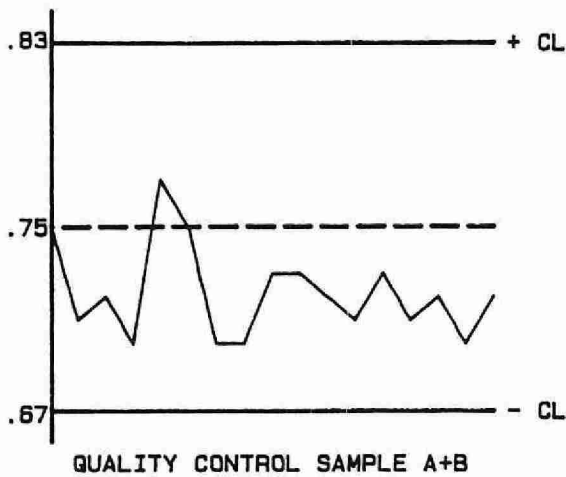
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coeff. of va
37	0.00 - 0.15	0.008	13
12	0.15 - 0.38	0.023	10
3	0.38 - 0.75	0.046	9
52	Overall	0.017	N

OTHER CHECKS:

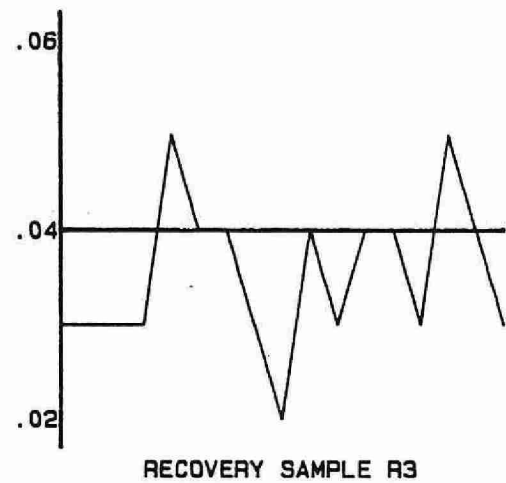
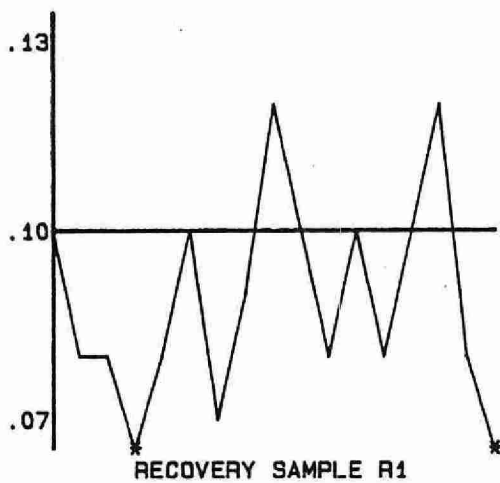
	Number of Data	Data Mean	Standar Deviat
Digested Blank :	17	0.00	0.00

QUALITY CONTROL GRAPHS POTASSIUM - SOIL (XSC) (MEQ/100G)

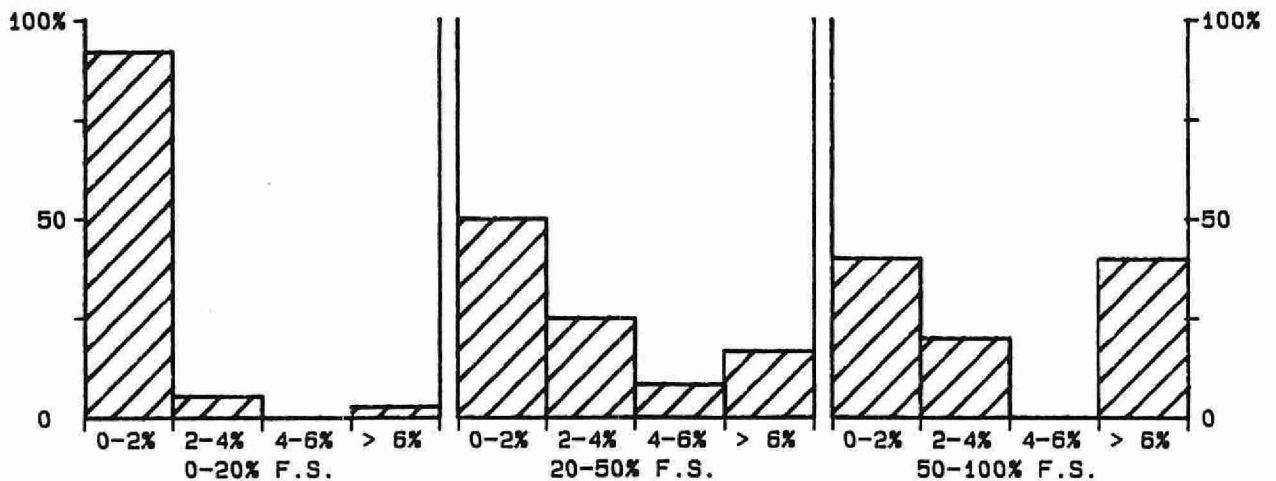
FROM: 03/04/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .75 MEQ/100G

***** SAND *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SAND	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of sand in the sample is determined by weighing the dried sieved fraction and expressing that as a percentage by weight of the total (sand, silt and clay) recovered.

INSTRUMENTATION:

-Sartorius 4 place digital balance (model 1201)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types
 plus a round robin CSSC sample

NOTES:

Two recovery soils are alternated between batches, using their mean values.

SAND
QUALITY CONTROL DATA FROM 12/01/87 TO 11/07/87

Lab: Dorset Soils

Analytical Range: N/A to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
r1 :	11	5	5	1.0
r2 :	13	65	66	2.9

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	2	0 - 20	0.7	5.1
	5	20 - 50	0.9	2.6
	20	50 - 100	1.4	2.2
	27	Overall	1.3	N/A

STANDARD DEVIATION (s.dup1): N/A

W value: N/A

T value: N/A

SAND
QUALITY CONTROL DATA FROM 07/10/87 TO 21/12/87

Lab: Dorset Soils

Analytical Range: 8 to 100 % by wt.

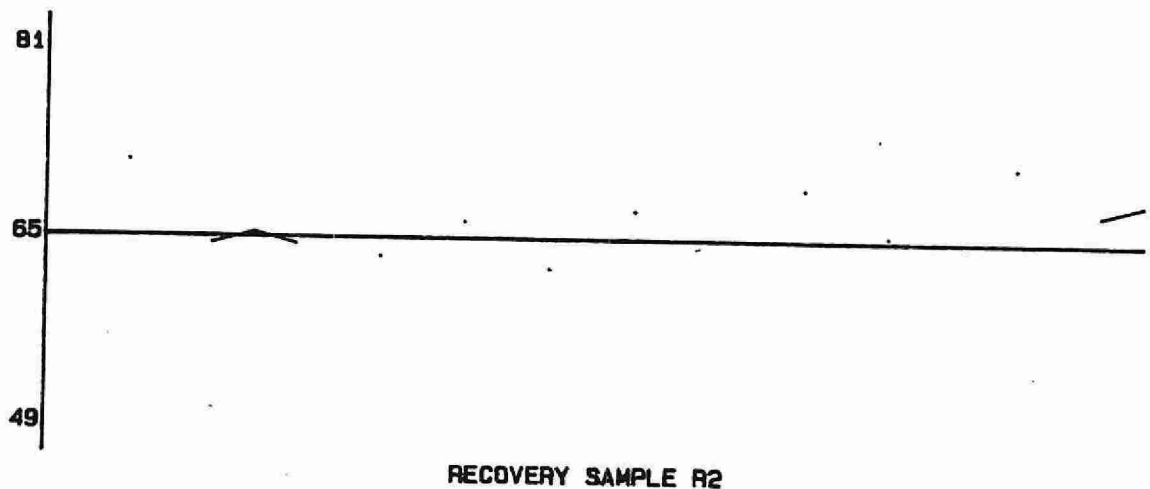
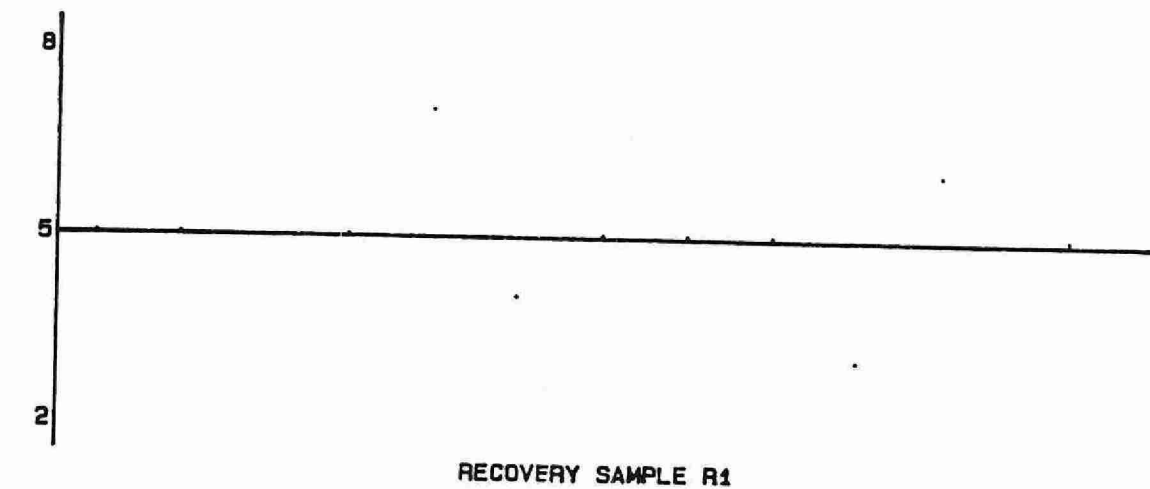
RECOVERIES:	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
	-----	-----	-----	-----
r1 :	14	5	5	0.5
r2 :	16	52	53	3.9

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	2	0 - 20	1.6	10.5
	7	20 - 50	1.1	3.4
	20	50 - 100	1.7	2.3
	29	Overall	1.5	N/A

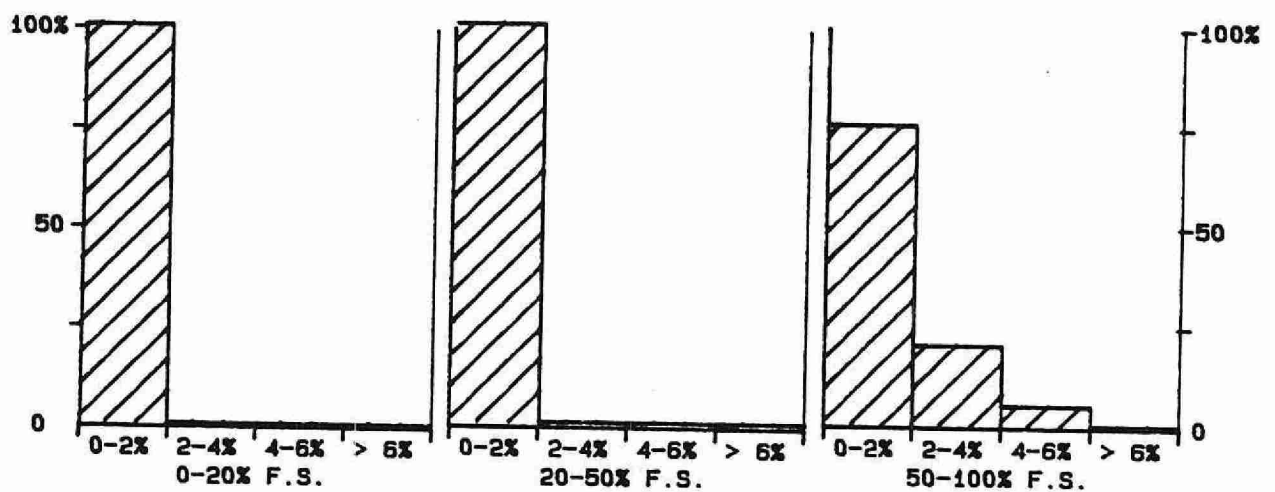
QUALITY CONTROL GRAPHS

SAND (% BY WT.)

FROM: 12/01/87
TO: 11/07/87



--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

***** SILICON - REACTIVE SILICATES *****

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/02/75
LIS Test Name Code	: SIO3UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents Domestic Water Supplies, Leachates		

SAMPLING:

Quantity Required : 10 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference. Approximate absorbance: 0.7 at the full scale level.

N.B. Chloride, dissolved inorganic and organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : BL every 10 samples; standards every 20 samples

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10. The analytical rate was tripled. Concentrations of QC standards adjusted accordingly.

27/03/85 -Silicon analytical range was changed from 0-5.00 mg/L to 0-10.00 mg/L. First three months' data were omitted because they were not comparable with the later ones.

12/03/86 -Boxed-FIA system discontinued. Basic air-segmented continuous flow system implemented. Test transferred from RMSICL to ROM workstation. HP9920 microcomputer system introduced. Calibration standards changed from 10 to 7.

NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$.

SILICON
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Colourimetry

Analytical Range: 0.25 to 10.00 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	167	8.00	7.98	-0.02	0.065
b :	167	2.00	1.98	-0.02	0.043
a+b :	167	10.00	9.96	-0.04	0.090
a-b :	167	6.00	6.00	-0.00	0.063
c :	166	2.00	1.99	-0.01	0.041
d :	166	0.50	0.50	-0.00	0.037
c+d :	166	2.50	2.48	-0.02	0.068
c-d :	166	1.50	1.49	-0.01	0.037

s.d.(AB): Sw(within run): 0.045 S(between runs): 0.055 S/Sw: 1.24
s.d.(CD): Sw(within run): 0.026 S(between runs): 0.039 S/Sw: 1.49

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55 to 10.45 for A+B
5.70 to 6.30 for A-B
2.27 to 2.73 for C+D
1.35 to 1.65 for C-D

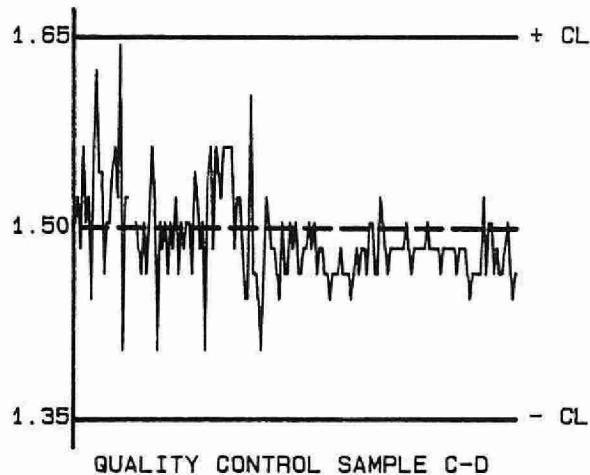
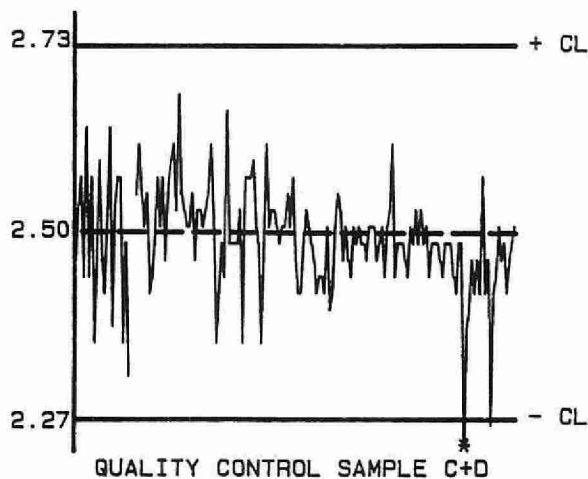
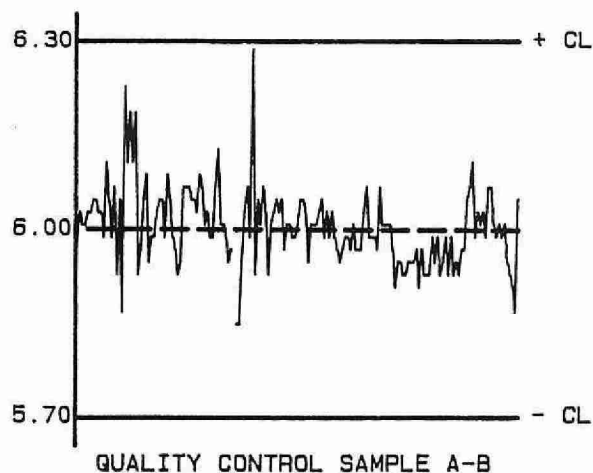
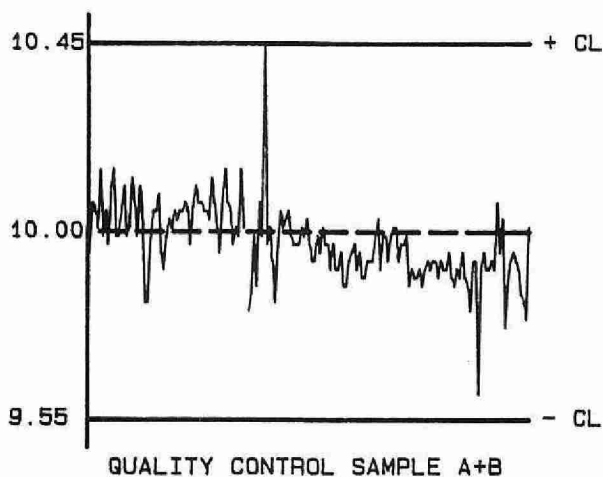
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	158	0.00 - 1.00	0.050	10.2
	106	1.00 - 2.00	0.074	4.9
	136	2.00 - 5.00	0.115	3.4
	59	5.00 - 10.00	0.140	2.0
	459	Overall	0.093	N/A

OTHER CHECKS:

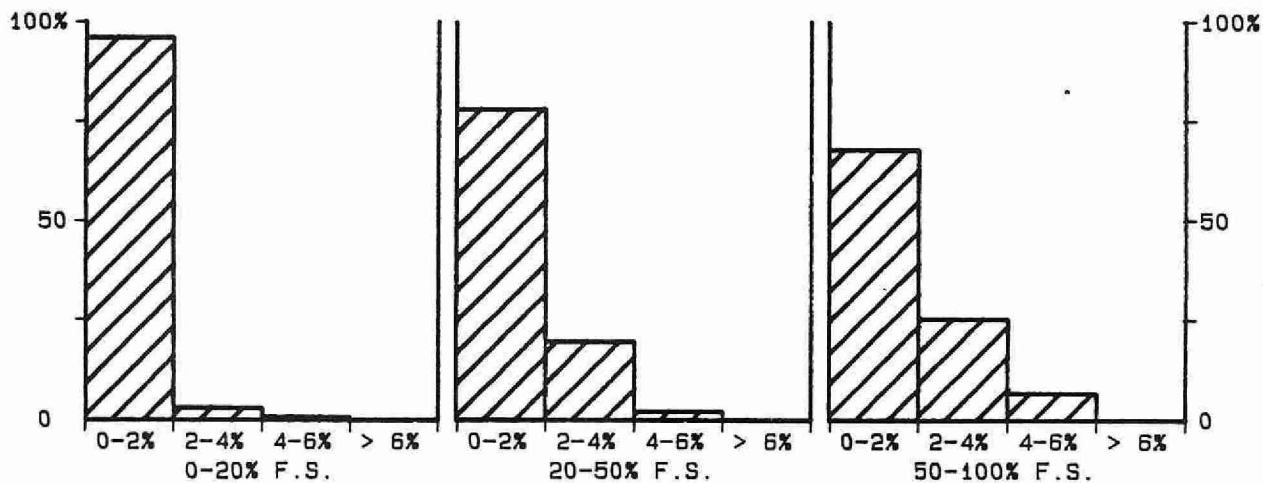
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	165	0.01	0.047

QUALITY CONTROL GRAPHS SILICON (MG/L AS SI)

FROM: 06/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS SI

***** SILT *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SILT	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 20 g dry
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Samples are air dried, disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (>53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of silt in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

-Sartorius 4 place digital balance (model 1201)
-Balance accurate to 0.0001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus a round robin CSSC sample (run occasionally).

NOTES:

Two recovery soils are alternated between batches, using their mean values.

SILT
 QUALITY CONTROL DATA FROM 13/01/87 TO 11/07/87

Lab: Dorset Soils

Analytical Range: 10 to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
	-----	-----	-----	-----
r1 :	12	43	46	3.6
r2 :	13	30	29	2.9

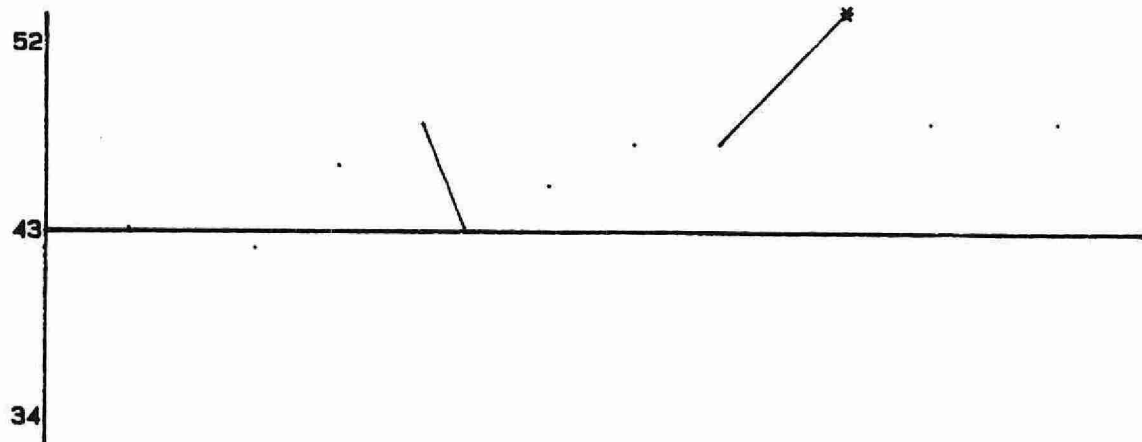
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	6	0 - 20	1.9	11.9
	18	20 - 50	2.3	6.7
	2	50 - 100	1.4	2.6
	26	Overall	2.1	N/A

STANDARD DEVIATION (s.dup1): 2.3 W value: 2 T value: 10

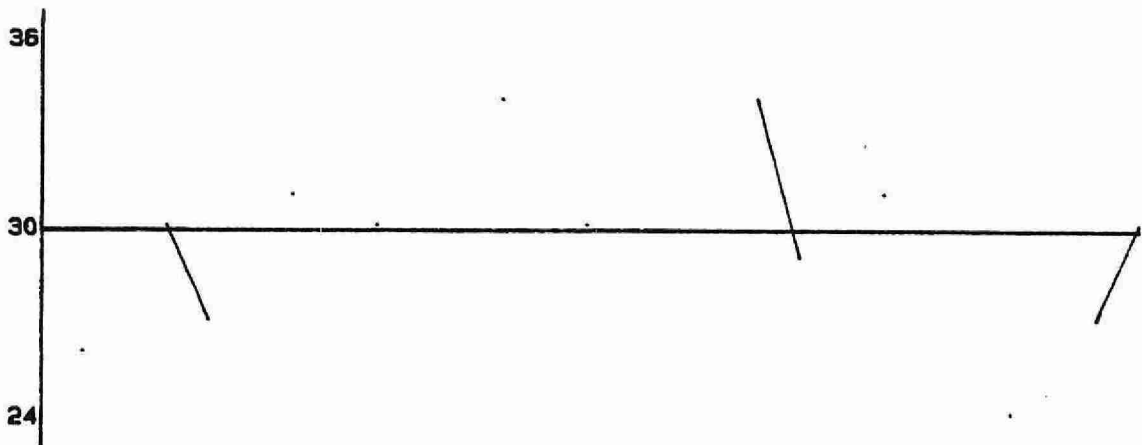
QUALITY CONTROL GRAPHS SILT (% BY WT.)

FROM: 13/01/87

TO: 11/07/87

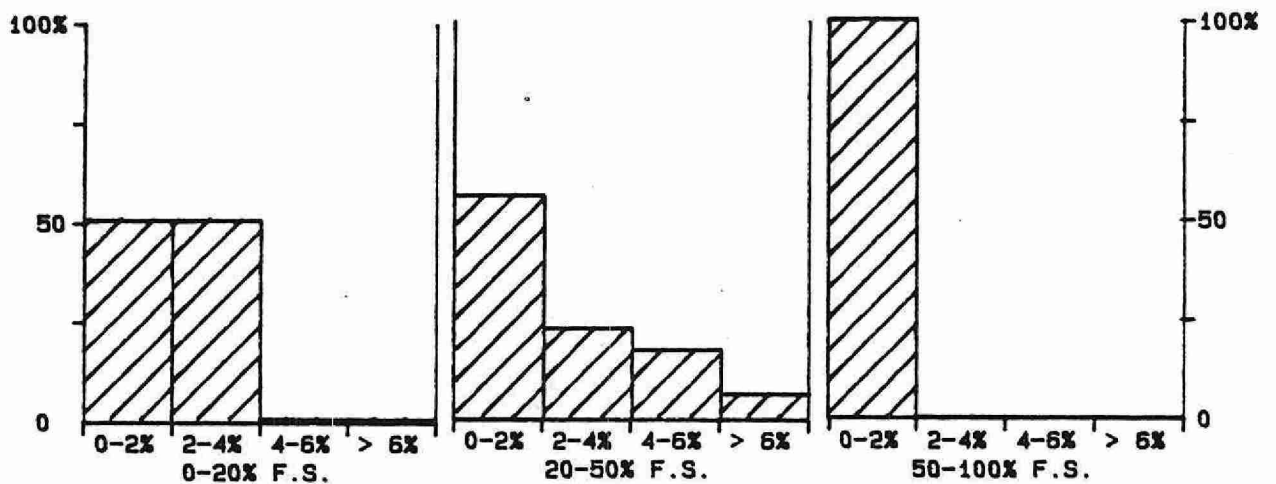


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

SILT
QUALITY CONTROL DATA FROM 07/10/87 TO 21/12/87

Lab: Dorset Soils

Analytical Range: 4 to 100 % by wt.

RECOVERIES:

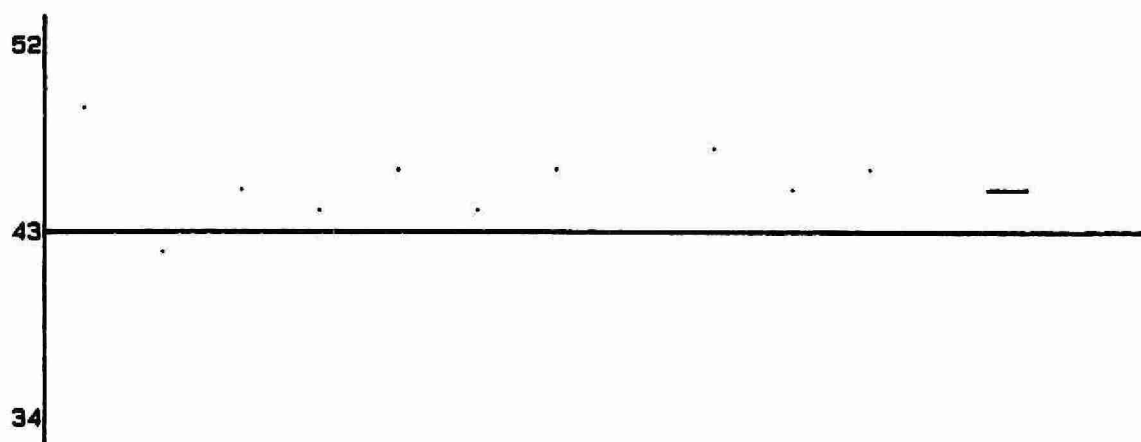
	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
r1 :	13	43	45	1.8
r2 :	16	46	46	3.7

DUPLICATES:

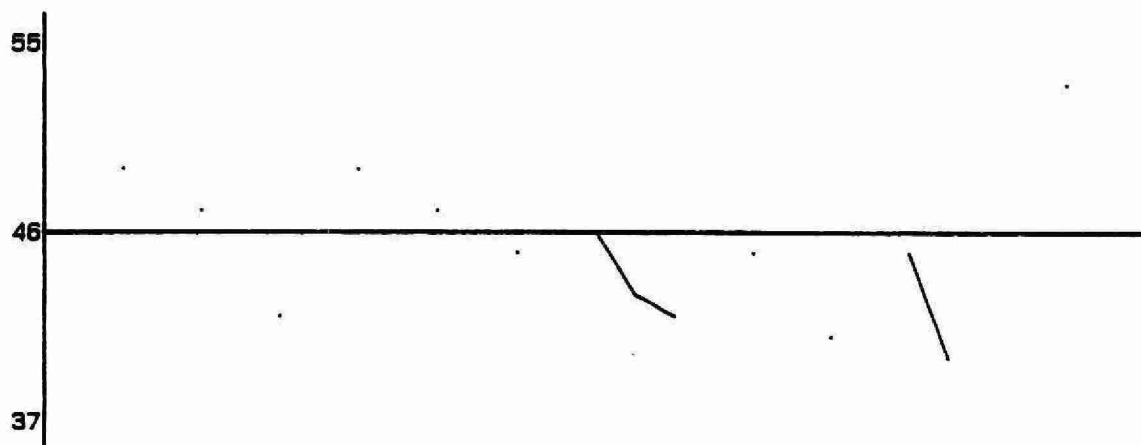
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0 - 20	0.8	6.7
19	20 - 50	1.6	5.0
2	50 - 100	1.1	2.0
28	Overall	1.4	N/A

QUALITY CONTROL GRAPHS SILT (% BY WT.)

FROM: 07/10/87
TO: 21/12/87

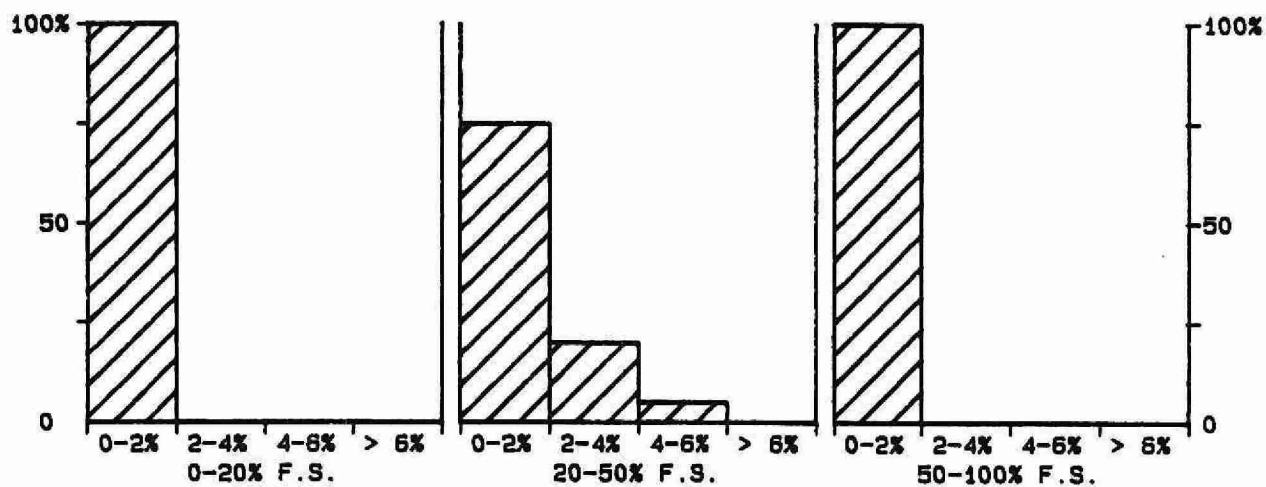


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAA	Unit Code	: 064811
Method Code	: 002EA1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required : 5 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

SODIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 23/12/87

Lab: Atomic Absorption

Analytical Range: 0.019 to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	71	0.600	0.597	-0.003	0.0077
b :	71	0.100	0.097	-0.003	0.0049
a+b :	71	0.700	0.694	-0.006	0.0087
a-b :	71	0.500	0.500	0.000	0.0096

s.d.(AB): Sw(within run): 0.0068 S(between runs): 0.0065 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

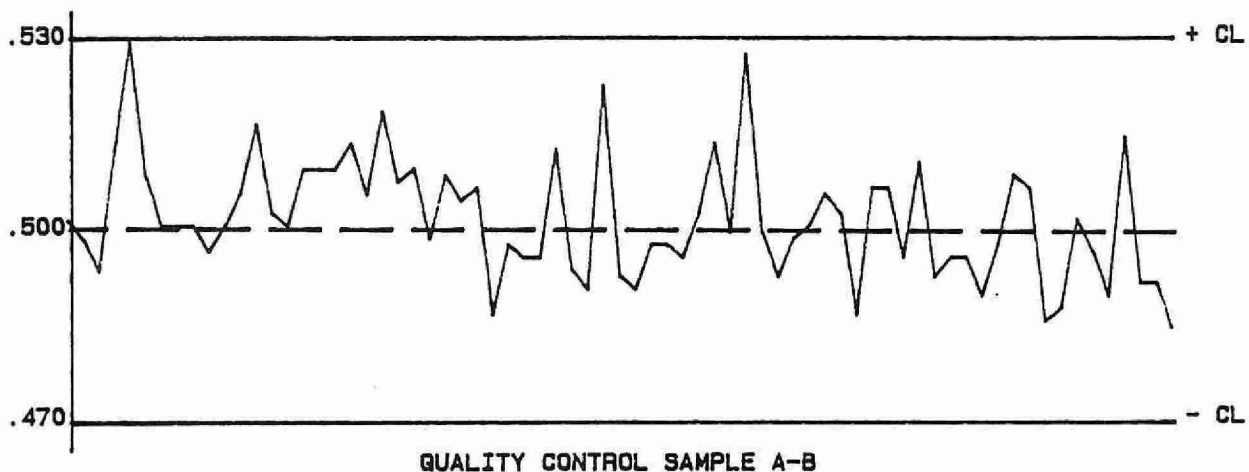
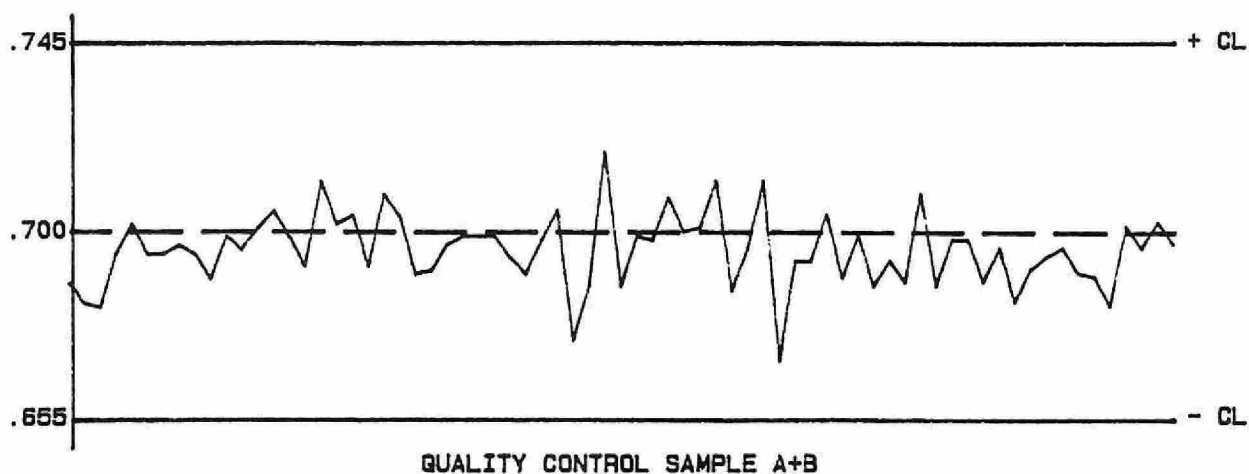
0.655 to 0.745 for A+B
0.470 to 0.530 for A-B

DUPLICATES:

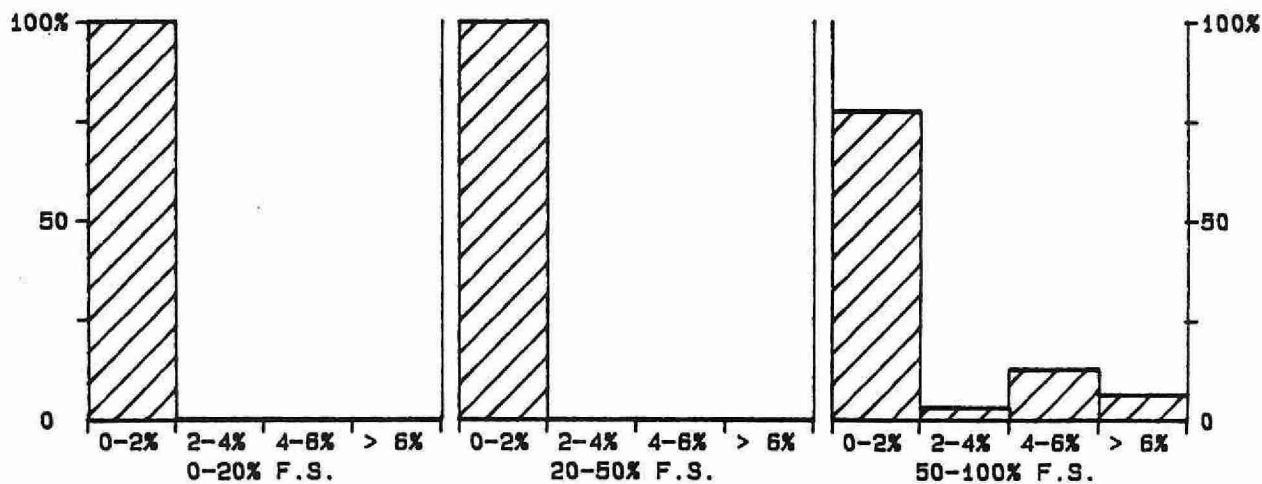
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
102	0.000 - 0.100	0.0039	9.7
22	0.100 - 0.200	0.0037	2.9
44	0.20 - 1.00	0.301	57.2
168	Overall	0.154	N/A

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 06/01/87
TO: 23/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS NA

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required : 6 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at the full scale value.

INSTRUMENTATION:

Automated flow injection absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration : LTBL plus 3 standards plus LTB e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 10.0 mg/L full scale; second analytical range was dropped.
01/03/84 -Analytical range (RMNAKH) was increased from 10.0 to 20.0 mg/L full scale.
Calibration technique was changed from quadratic to linear interpolation. Potassium is no longer determined simultaneously.
25/09/85 -Calibration range remains at 20.0 mg/L full scale but second analytical range was dropped. Concentrations of QC standards were adjusted accordingly. Commodore PET microcomputer controlled system with sample flow injection introduced.
1985 -Three analytical ranges were used during 1985: 2.00, 20.0, and 20.0 mg/L as Na full scale.
06/04/87 -Full scale remained at 20 mg/L as Na but number of cal.standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus one LTB

SODIUM
QUALITY CONTROL DATA FROM 05/01/87 TO 02/04/87

Lab: Atomic Absorption

Analytical Range: 0.1 to 20.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	16.00	16.03	0.03	0.156
b :	25	1.40	1.41	0.01	0.060
a+b :	25	17.40	17.44	0.04	0.181
a-b :	25	14.60	14.62	0.02	0.151

s.d.(AB): Sw(within run): 0.107 S(between runs): 0.118 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

16.50 to 18.30 for A+B
14.00 to 15.20 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
40	0.00 - 1.00	0.045	7.0
13	1.00 - 2.00	0.121	7.9
8	2.00 - 4.00	0.054	1.8
8	4.00 - 10.00	0.103	1.6
0	10.00 - 20.00	N/A	N/A
69	Overall	0.074	N/A

STANDARD DEVIATION (s.dupl): 0.045

W value: 0.02

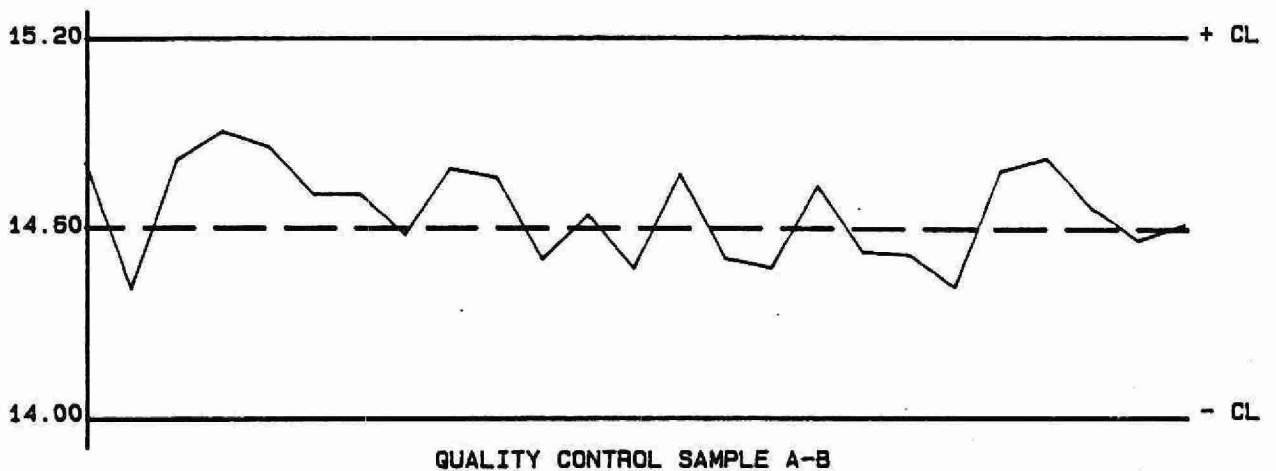
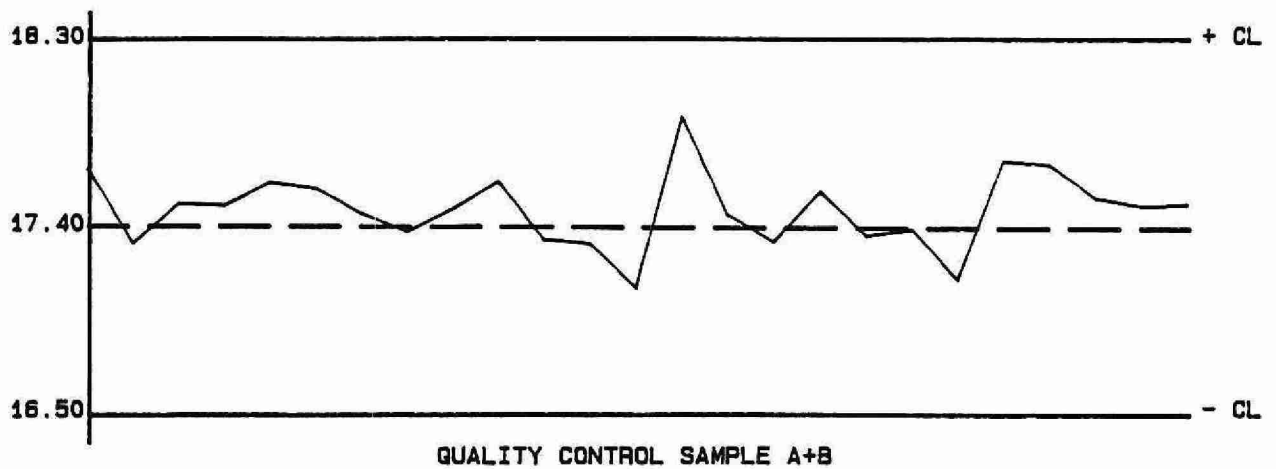
T value: 0.1

OTHER CHECKS:

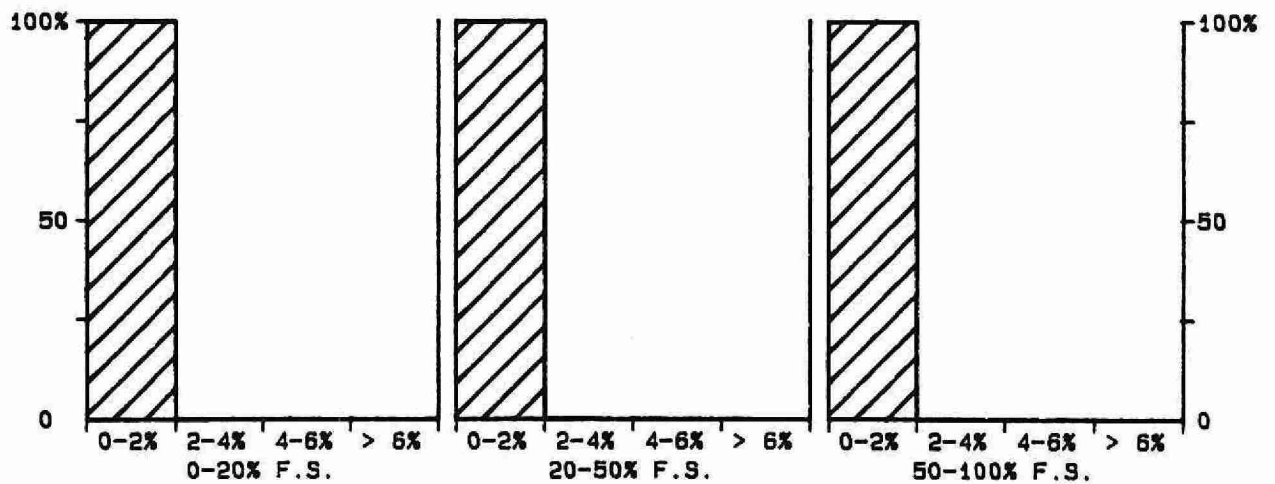
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	23	1.149	0.0598
Long Term Blank :	25	-0.00	0.044

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 05/01/87
TO: 02/04/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS NA

SODIUM
QUALITY CONTROL DATA FROM 07/04/87 TO 31/12/87

Lab: Atomic Absorption

Analytical Range: 0.14 to 20.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	91	16.00	15.95	-0.05	0.183
b :	91	4.00	4.01	0.01	0.064
a+b :	91	20.00	19.96	-0.04	0.209
a-b :	91	12.00	11.94	-0.06	0.176
c :	90	4.00	4.01	0.01	0.064
d :	90	1.000	1.009	0.009	0.0360
c+d :	90	5.000	5.021	0.021	0.0874
c-d :	90	3.000	3.002	0.002	0.0568

s.d.(AB): Sw(within run): 0.124 S(between runs): 0.137 S/Sw: 1.10
s.d.(CD): Sw(within run): 0.040 S(between runs): 0.052 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.40 to 20.60 for A+B
11.60 to 12.40 for A-B
4.700 to 5.300 for C+D
2.800 to 3.200 for C-D

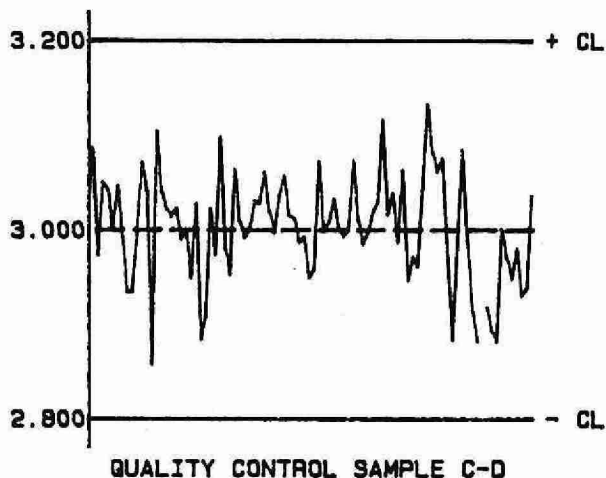
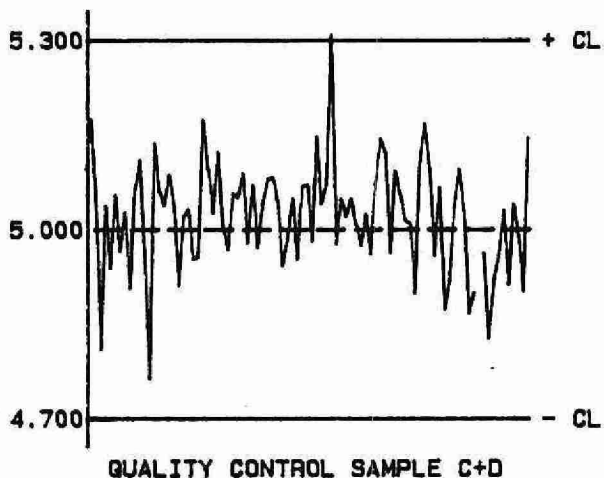
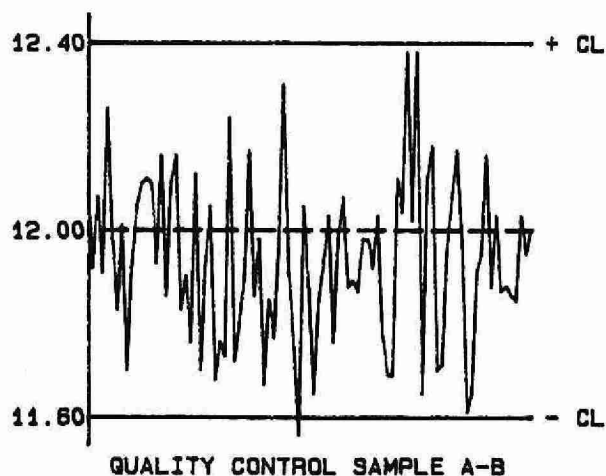
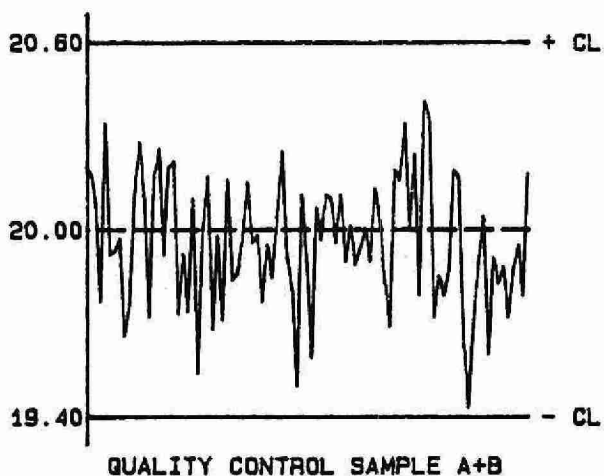
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	81	0.00 - 1.00	0.027	4.6
	37	1.00 - 2.00	0.033	2.3
	33	2.00 - 4.00	0.172	6.1
	63	4.00 - 10.00	0.084	1.4
	24	10.00 - 20.00	0.214	1.4
	238	Overall	0.105	N/A

OTHER CHECKS:

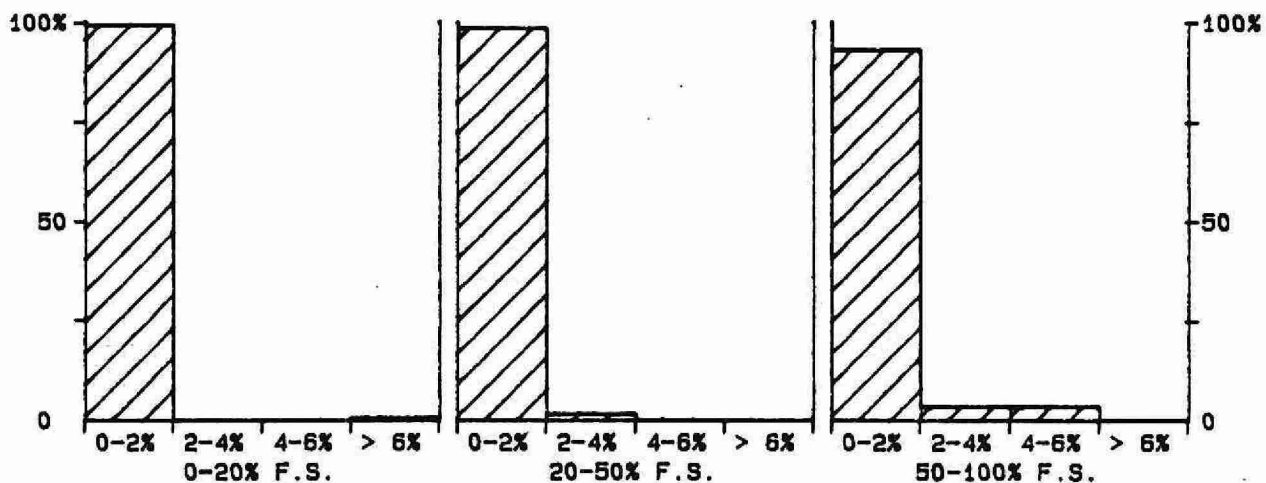
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	89	1.167	0.0659
Long Term Blank :	89	0.00	0.017

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 07/04/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS NA

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: WAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: F. Tomassini
Sample Type/Matrix wastes	: Domestic Waters, Leachates, Effluents, Sewage, Industrial		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.1 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.2	T value: 1
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CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, and LTB e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 200 mg/L to 100 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

03/03/86 -Full scale remains at 100 mg/l Na
Number of cal.standards changed from 10 to 11
Number of QC standards changed from 2 to 3 plus LTB

SODIUM
QUALITY CONTROL DATA FROM 06/01/87 TO 26/02/87

Lab: Atomic Absorption

Analytical Range: 1.34 to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	19	80.0	79.7	-0.3	0.94
b :	19	7.00	6.73	-0.27	0.306
a+b :	19	87.00	86.47	-0.53	1.104
a-b :	19	73.00	73.00	-0.00	0.859

s.d.(AB): Sw(within run): 0.61 S(between runs): 0.70 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

82.50 to 91.50 for A+B
 70.00 to 76.00 for A-B

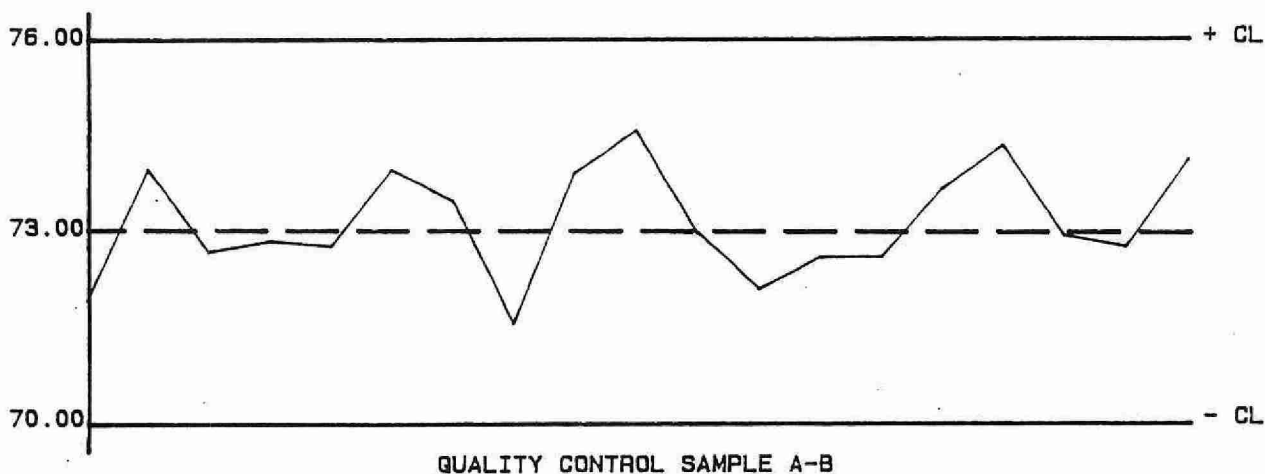
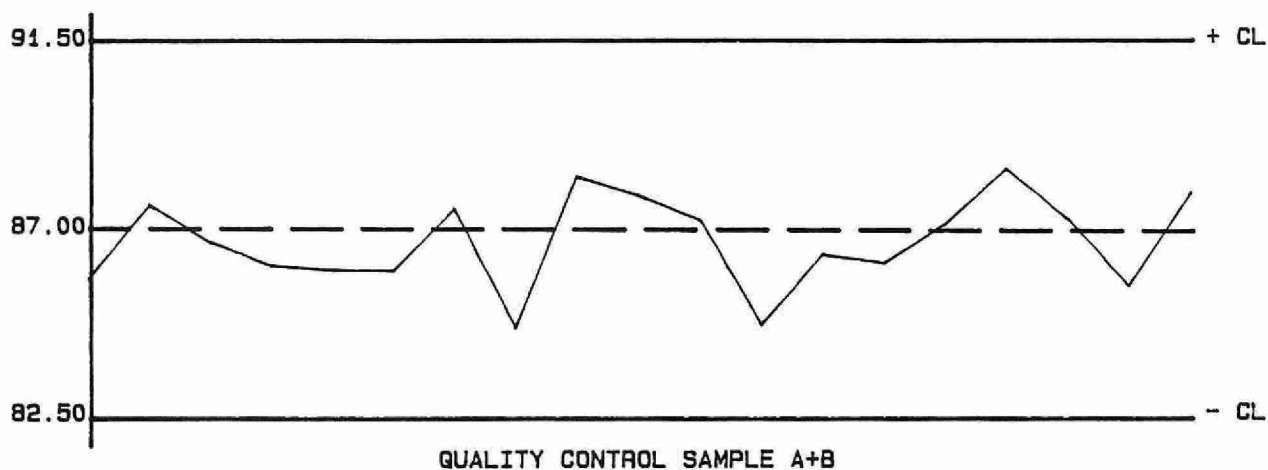
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	11	0.00 - 5.00	0.269	9.1
	14	5.00 - 10.00	0.576	7.7
	12	10.0 - 25.0	0.35	2.2
	3	25.0 - 50.0	0.20	0.6
	2	50.0 - 100.0	1.73	2.1
	42	Overall	0.56	N/A

OTHER CHECKS:

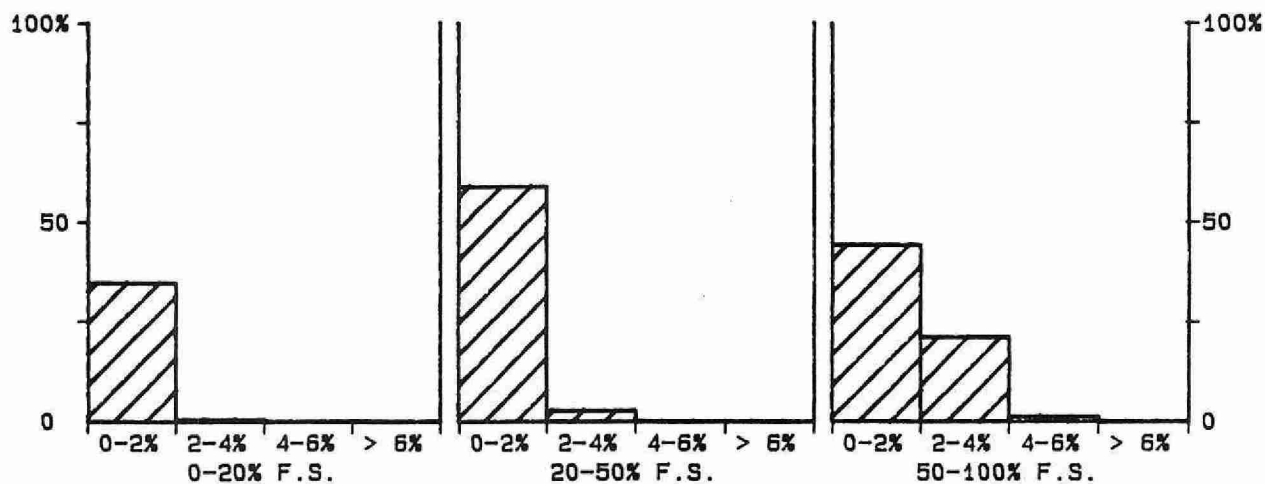
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	19	1.145	0.0798
Long Term Blank :	19	-0.06	0.191

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 06/01/87
TO: 26/02/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



SODIUM
QUALITY CONTROL DATA FROM 12/03/87 TO 29/12/87

Lab: Atomic Absorption

Analytical Range: 0.94 to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	136	80.0	79.9	-0.1	1.03
b :	136	20.00	20.07	0.07	0.455
a+b :	136	100.00	99.96	-0.04	1.248
a-b :	136	60.00	59.83	-0.17	0.994
c :	135	20.00	20.08	0.08	0.416
d :	135	5.00	5.14	0.14	0.500
c+d :	135	25.00	25.22	0.22	0.775
c-d :	135	15.00	14.94	-0.06	0.494

s.d.(AB): Sw(within run): 0.70 S(between runs): 0.80 S/Sw: 1.13
s.d.(CD): Sw(within run): 0.349 S(between runs): 0.460 S/Sw: 1.32

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.50 to 104.50 for A+B
57.00 to 63.00 for A-B
22.75 to 27.25 for C+D
13.50 to 16.50 for C-D

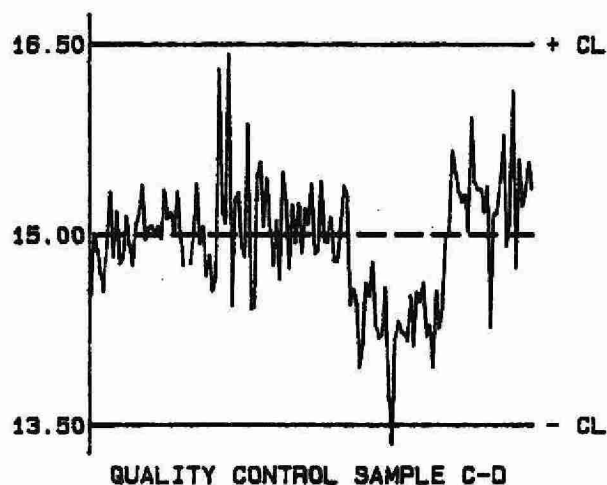
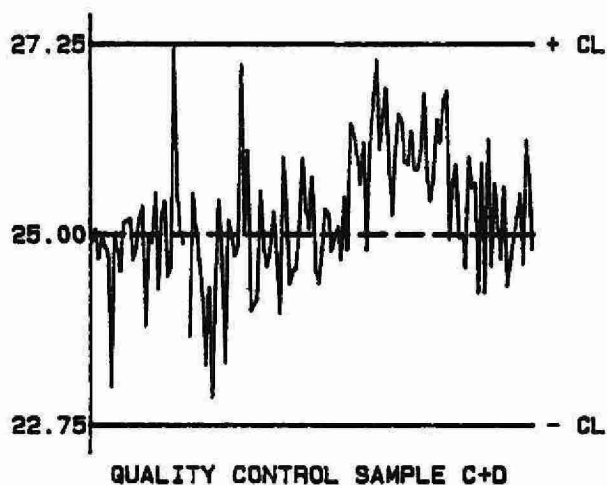
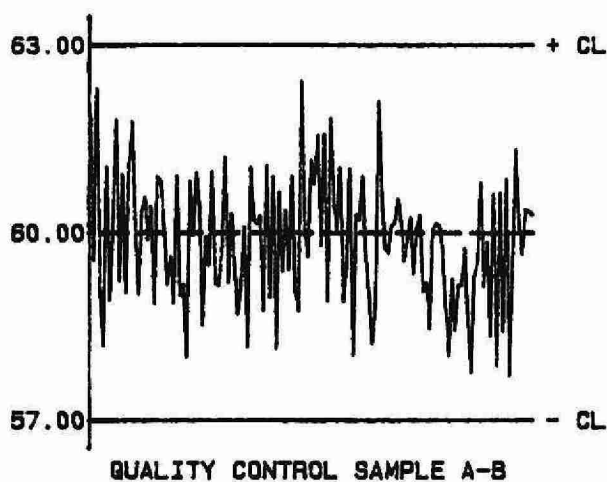
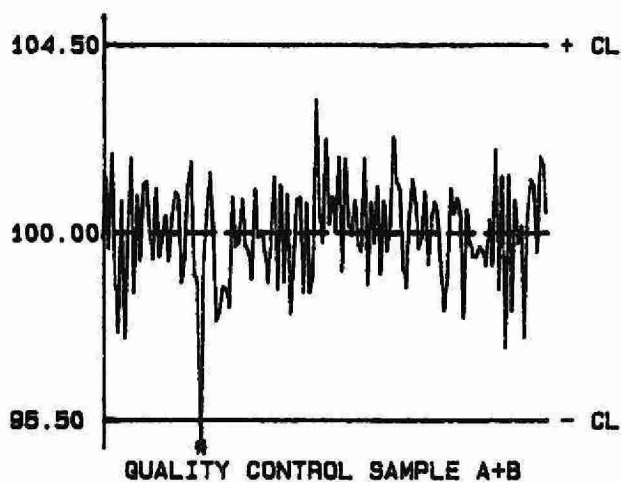
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	87	0.00 - 5.00	0.188	6.3
	79	5.00 - 10.00	0.239	3.2
	96	10.0 - 25.0	0.48	2.9
	41	25.0 - 50.0	0.67	1.9
	35	50.0 - 100.0	0.96	1.3
	338	Overall	0.49	N/A

OTHER CHECKS:

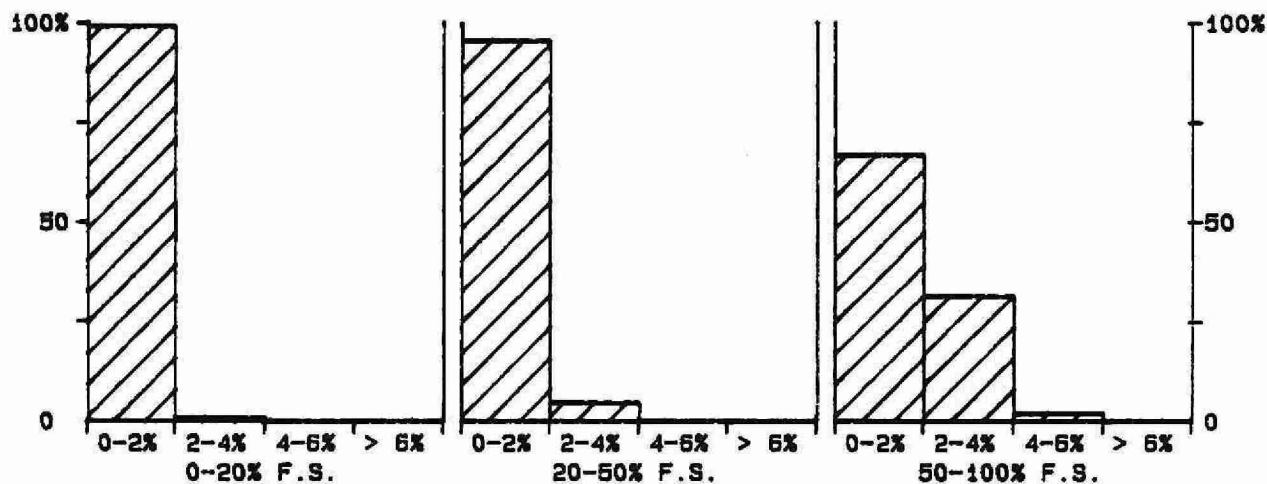
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	136	1.171	0.0765
Long Term Blank :	128	-0.03	0.134

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 03/03/87
TO: 29/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS NA

***** SODIUM *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: NAUR	Units	: ug/Filter as Na
Work Station Code	: PRLOV	Unit Code	: 361811
Method Code	: 004AA3	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS (workstation PRAA) at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Result are converted to ug/filter as Na.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

July 81 -Addition of potassium analysis for W40 filters from LoVol filter packs was introduced.
17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of a microcomputer to coordinate sampler, injection, AAS "read", and data reduction. Sample required reduced to 5 mL.

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

***** SOLIDS - DISSOLVED *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: RMTSD	Unit Code	: 064000
Method Code	: 101AI5	Supervisor	: P. Campbell
Sample Type/Matrix	: River, Lakes, Effluents		

SAMPLING:

Quantity Required : 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sample (shaken) is filtered under moderate suction through a Whatman 934AH glass fibre filter. One hundred mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing the dissolved residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

- Balance (4/5-decimal places), drying oven, suction filtration apparatus, Teflon dishes
- Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: N/A T value: N/A

CALIBRATION:

Balance zero and 1 built-in calibration weight.

CONTROLS:

Calibration : 2 S class weights, e.g. QCA
Recovery : LTBL plus 2 standards, e.g. R1
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

15/01/82 -QC program was expanded to include recovery standards.
01/05/84 -Microcomputer control was introduced.
26/03/86 -TEST TRANSFERRED TO SOLIDS AND BOD FROM RIVERS AND LAKES. 100mL aliquot and Teflon dishes used).

NOTES:

*Dissolved solids in surface waters normally are estimated when the conductivity of the sample is less than 800 uS/cm:

$$\text{Dissolved solids(mg/L)} = 0.65 \times \text{Conductivity(uS/cm)}$$

Hence, few data from direct measurements at low concentrations are available to calculate the detection criterion of this gravimetric test.

*** SOLIDS - DISSOLVED ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required : 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing the dissolved residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

- Balance (4/5-decimal places), drying oven, suction filtration apparatus, Teflon dishes
- Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

Balance zero and 1 built-in calibration weight.

CONTROLS:

Calibration : 2 S class weights, e.g. QCA
Recovery : LTBL plus 2 standards, e.g. R1
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

15/01/82 -Microcomputer control was introduced
01/07/85 -Teflon dishes replaced ceramic dishes and aliquot volume increased to 100 mL for most samples.
01/12/86 -Correction factor for dish tare weights was included in calculation, based on variations of a standard sealed vessel.

NOTES:

As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are only listed once: in the Solids-Total report.

SOLIDS - DISSOLVED
QUALITY CONTROL DATA FROM 26/01/87 TO 27/12/87

Lab: Solids

Analytical Range: 20.5 to 3000 mg/L

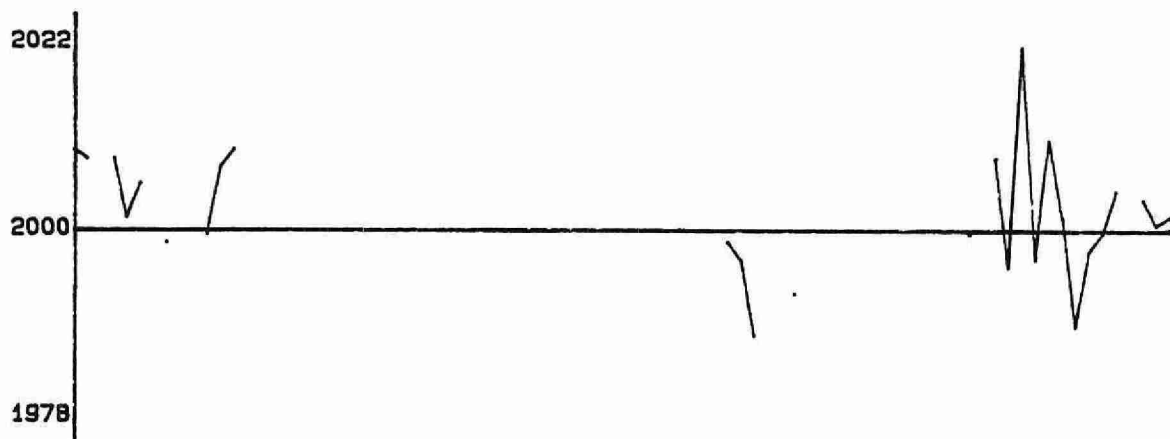
RECOVERIES:	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
r1 :	27	2000	2001	7.3
r2 :	28	500	503	3.6

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	16	0.0 - 200.0	4.10	2.4
	27	200 - 400	6.1	1.9
	44	400 - 600	13.1	2.7
	21	600 - 1000	14.6	2.0
	16	1000 - 3000	15.5	1.0
	124	Overall	11.8	N/A

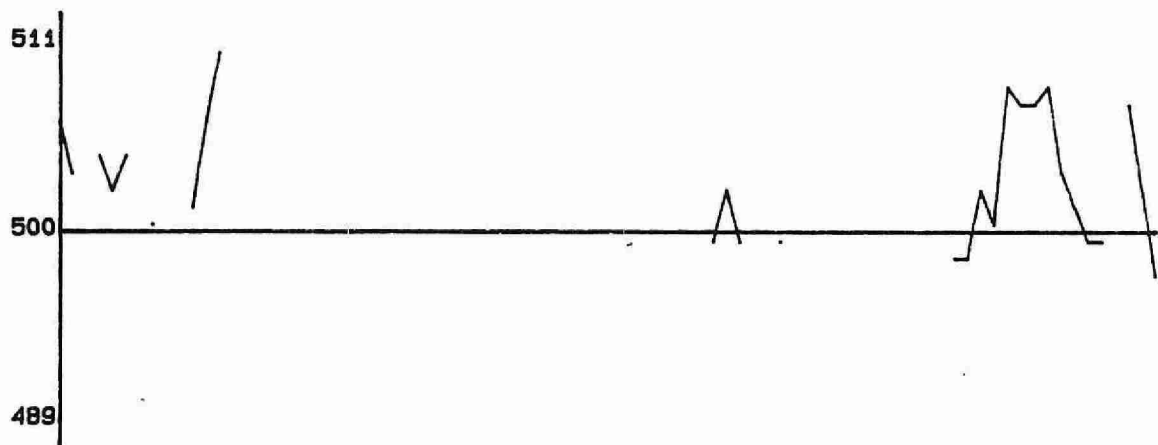
OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
Blank :	63	1.76	2.212

QUALITY CONTROL GRAPHS SOLIDS - DISSOLVED (MG/L)

FROM: 26/01/87
TO: 27/12/87

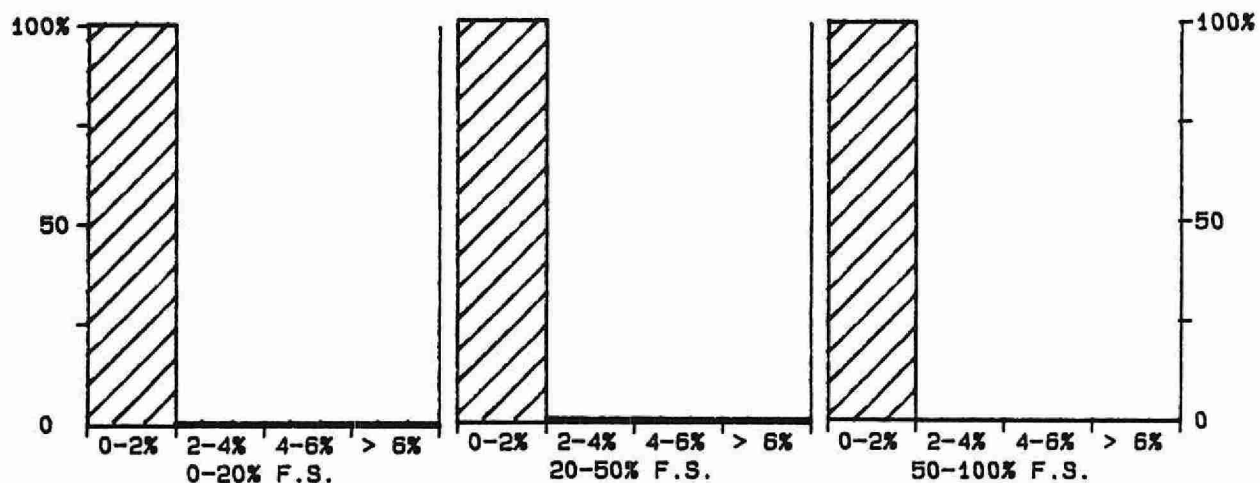


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

***** SOLIDS - IGNITED *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RSFA,RSPA,RSTA	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 107AB4,207AB5,507AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required : 75-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for dissolved, particulate, or total solids is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The ignited or ash weight is obtained as the difference between the final ignited weight and the original dish weight. Similarly the volume used in the ignited calculations is the volume selected for the original dried solids measurement. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance (4/5-decimal places), muffle furnace, ceramic dishes, Petri dishes
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2,2,20 T value: 10,10,100

CONTROLS:

Calibration : 4 S class weights, e.g. QCA
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

01/05/82 -Microcomputer control was introduced

NOTES:

-In the order listed above, W and T values refer to the residual ash after ignition of the dried residual from dissolved, particulate, and total solids determinations.
-Duplicate data refer to ash residuals rather than loss on ignition.
-Detection criteria estimates are unreliable due to limited data; samples requiring these tests are usually sewage sludges with high solids contents.
-As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are only listed once: in the Solids-Total report for Ignited Dissolved and Ignited Total test, and in the Solids-Particulate report for Ignited Particulate tests.

SOLIDS - DISSOLVED IGNITED
QUALITY CONTROL DATA FROM 26/01/87 TO 11/12/87

Lab: Solids

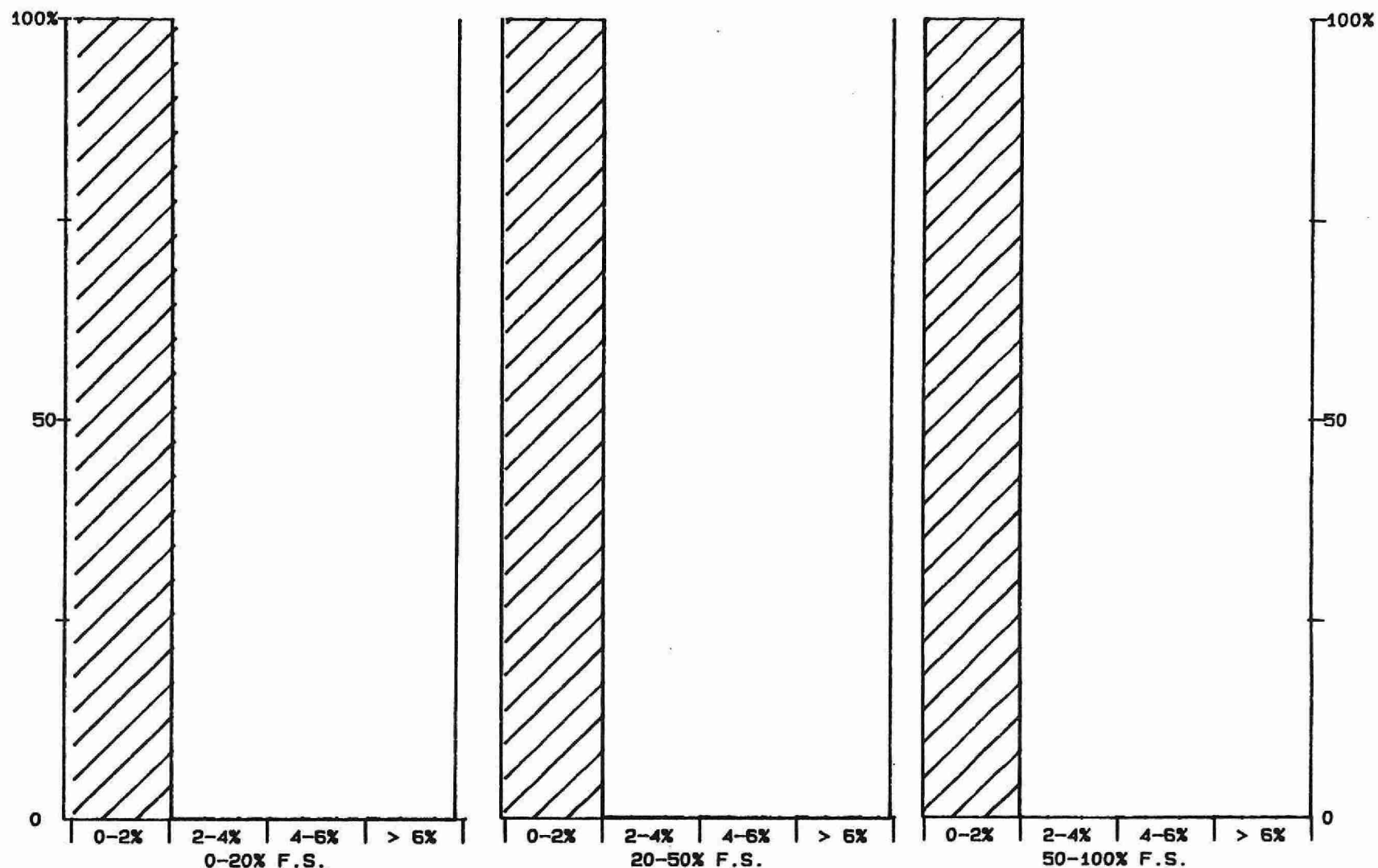
Analytical Range: - to 3000 mg/L

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	2	0.0 - 200.0	2.02	1.2
	7	200 - 400	8.0	2.7
	14	400 - 600	7.3	1.5
	7	600 - 1000	9.1	1.4
	4	1000 - 3000	9.0	0.6
	34	Overall	7.9	N/A

OTHER CHECKS:		Number of Data	Data Mean	Standard(1) Deviation
		-----	-----	-----
Blank	:	33	-2.00	3.955

QUALITY CONTROL GRAPH
SOLIDS - DISSOLVED IGNITED (MG/L)

FROM: 25/01/87
TO: 11/12/87



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

SOLIDS - PARTICULATE IGNITED
QUALITY CONTROL DATA FROM 05/01/87 TO 03/12/87

Lab: Solids

Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	0.50002	0.49998	-0.00004	0.000021
b :	46	0.05002	0.04999	-0.00003	0.000017
a+b :	46	0.55004	0.54998	-0.00006	0.000028
a-b :	46	0.45000	0.44999	-0.00001	0.000026

s.d.(AB): Sw(within run):0.000018 S(between runs):0.000019 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.5499 to 0.5501 for A+B
0.4499 to 0.4500 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
18	0.0 - 100.0	1.26	4.7
7	100 - 500	10.6	3.7
4	500 - 1000	11.1	1.7
3	1000 - 1500	24.3	1.9
1	1500 - 3000	N/A	N/A
33	Overall	13.5	N/A

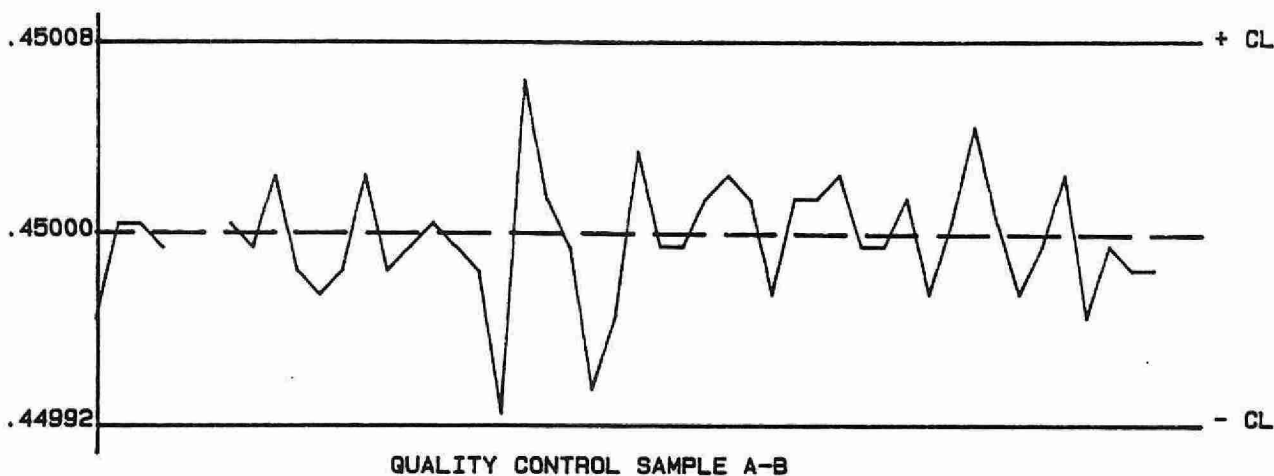
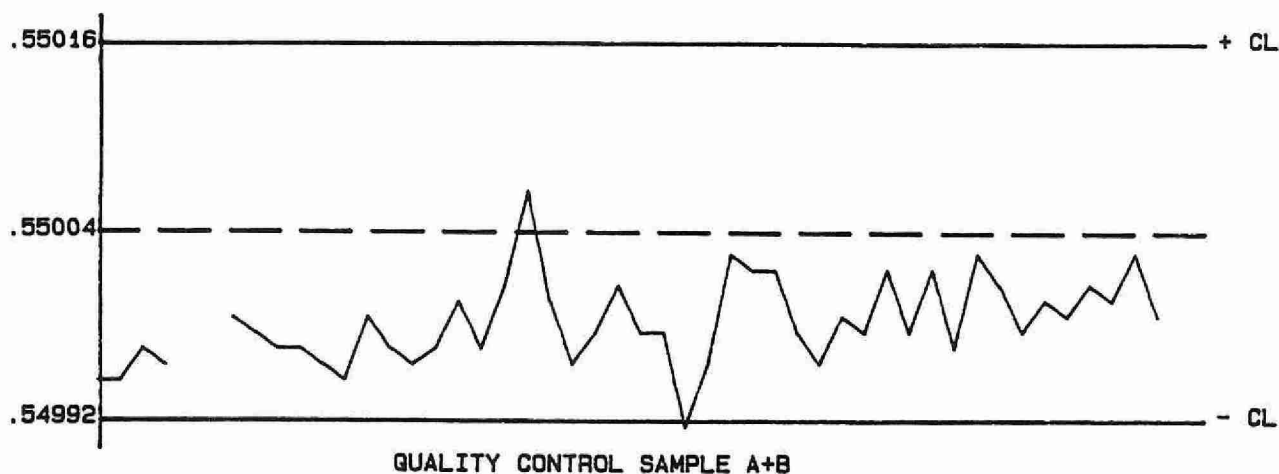
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank :	37	-0.36	0.239

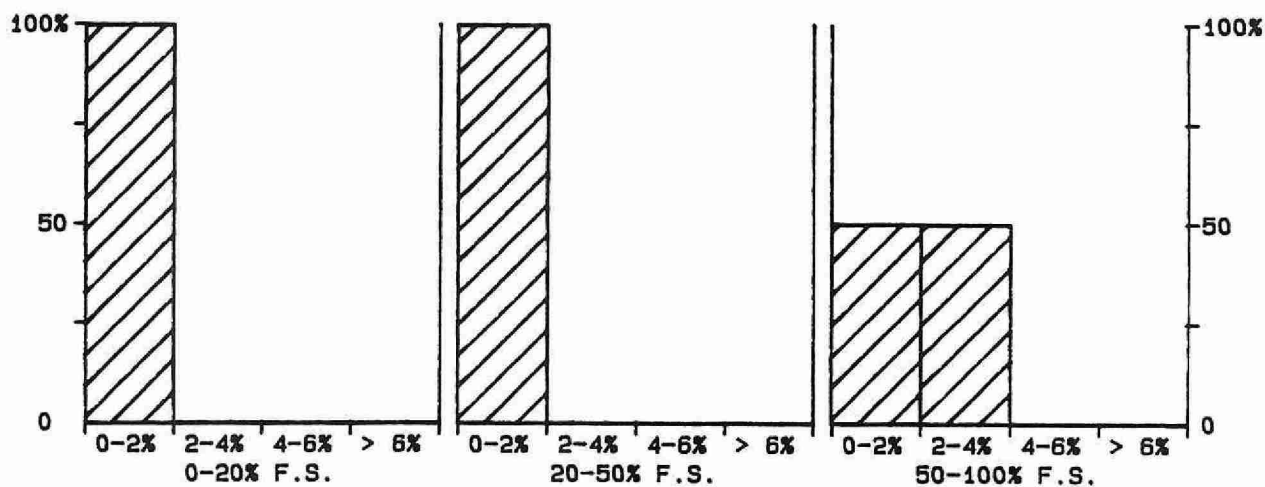
QUALITY CONTROL GRAPHS SOLIDS - PARTICULATE IGNITED (MG/L)

FROM: 05/01/87

TO: 03/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



SOLIDS - TOTAL IGNITED
QUALITY CONTROL DATA FROM 09/01/87 TO 31/12/87

Lab: Solids

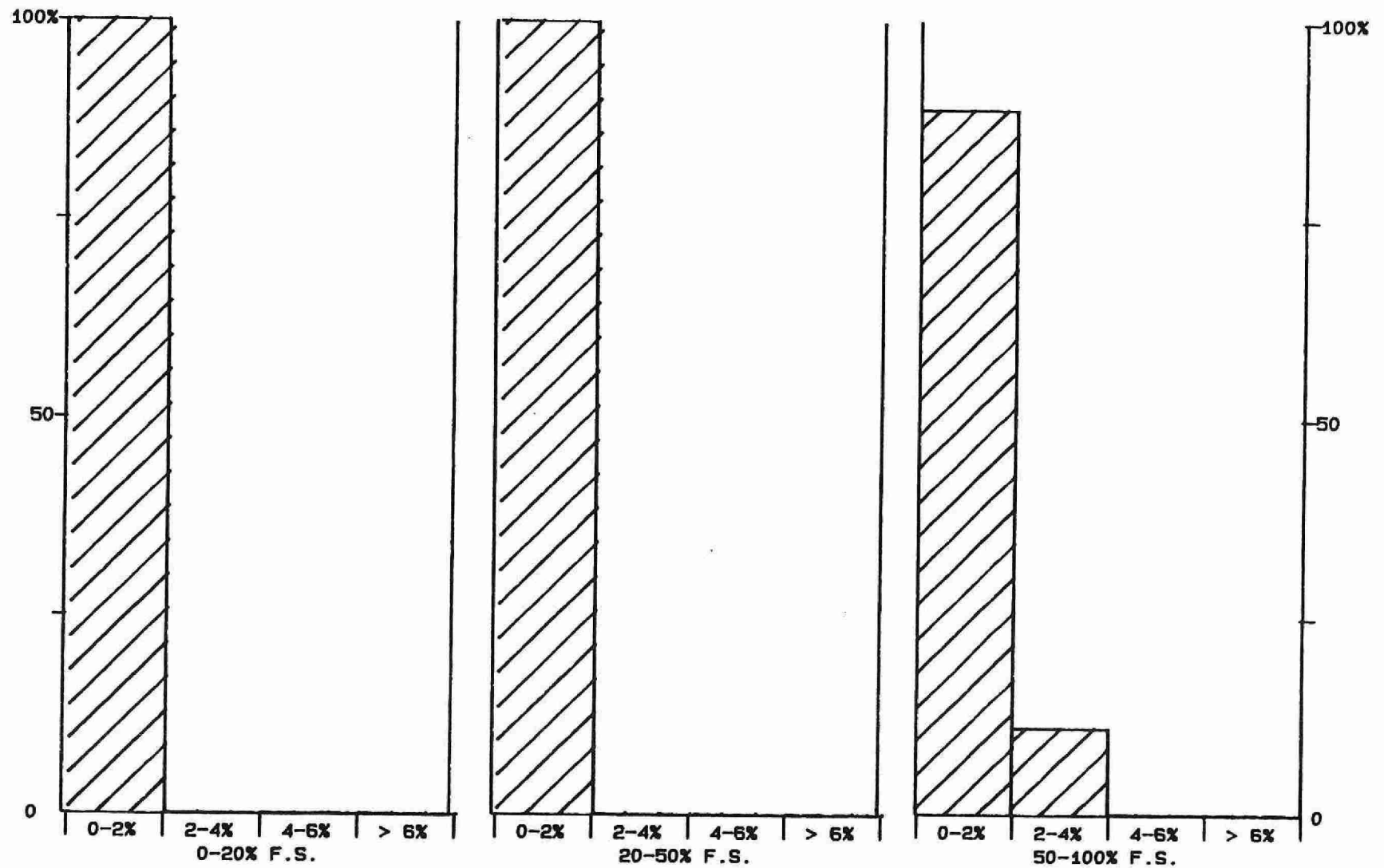
Analytical Range: - to 30000 mg/L

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	13	0 - 4000	32.3	2.0
	6	4000 - 8000	38.4	0.6
	4	8000 - 12000	140.4	1.4
	3	12000 - 18000	52.3	0.4
	4	18000 - 30000	301.5	1.2
	30	Overall	125.6	N/A

OTHER CHECKS:		Number of Data	Data Mean	Standard(1) Deviation
		-----	-----	-----
Blank	:	35	-2.98	4.383

QUALITY CONTROL GRAPH SOLIDS - TOTAL IGNITED (MG/L)

FROM: 09/01/87
TO: 31/12/87



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 30000 MG/L

***** SOLIDS - PARTICULATE *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RSP	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 206AB5	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents and Surface Waters		

SAMPLING:

Quantity Required : 5-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The cylinder and then the filter are washed with 30 mL distilled water. The filter is dried at 103-105°C, and suspended solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

- Balance (4/5-decimal places), drying oven, suction filtration apparatus
- Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

Balance zero

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA for each balance (results in grams)
Recovery	: LTBL plus 2 standards, e.g. R1
Drift	: Balance zero is checked 4 times daily
Blank	: Filter washed with 50 mL distilled water; corrected using blank correction factor outlined below (expected result: 0.00 mg/L).

MODIFICATIONS:

01/07/81 -Current microcomputer control system was introduced.
01/03/83 -QC program was expanded to include recovery standards.
01/05/83 -Prerinsing of filters was discontinued. Instead, 5 filters from each box of 100 were weighed before and after rinsing to correct results for filters used with samples.
01/07/83 -New glass and acrylic filter holders (Whatman 90 mm) replaced Buchner funnels.
26/03/86 -47 mm diameter magnetic filtration units used for all analyses. Aliquots used for mixed liquor and aeration samples were sometimes as low as 5 mL (i.e. factor 200) but precision should be improved at low end of analytical range.
01/12/86 -Same as for Solids and Dissolved.
01/08/87 -A standard correction factor was applied to all filters to account for weight loss during filtering (-0.0003g).

SOLIDS - PARTICULATE
QUALITY CONTROL DATA FROM 06/01/87 TO 07/12/87

Lab: Solids

Analytical Range: 4.3 to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	215	0.50002	0.49999	-0.00003	0.000022
b :	215	0.05002	0.05000	-0.00002	0.000018
a+b :	215	0.55004	0.54998	-0.00006	0.000034
a-b :	215	0.45000	0.44999	-0.00001	0.000022

s.d.(AB): Sw(within run):0.000016 S(between runs):0.000020 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.5498 to 0.5502 for A+B
0.4498 to 0.4501 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	54	187	184	2.2
r2 :	52	47.2	46.9	1.10

DUPLICATES:

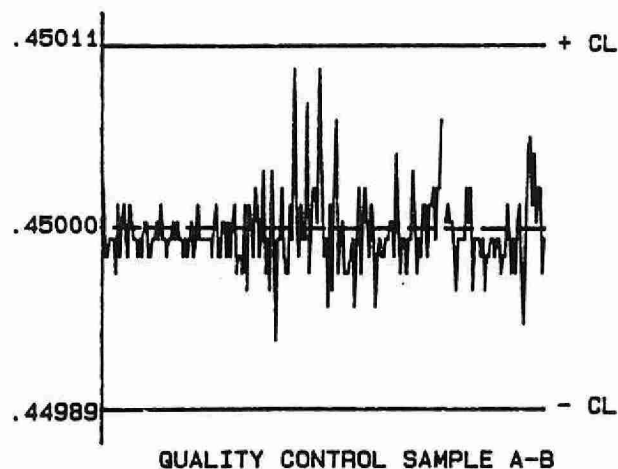
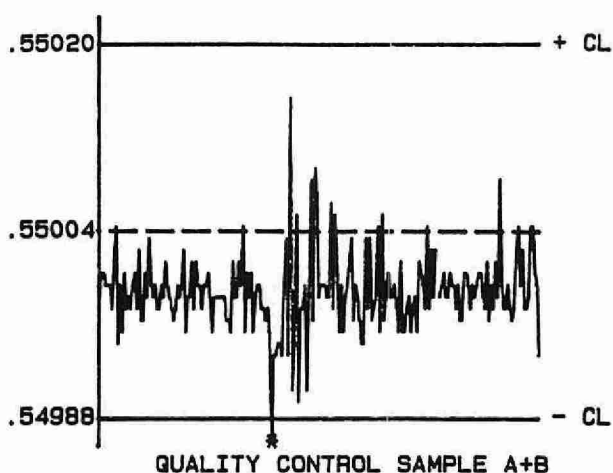
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
101	0.0 - 25.0	0.86	7.5
39	25.0 - 50.0	1.33	3.6
97	50.0 - 150.0	3.24	3.8
46	150 - 3000	25.8	4.6
283	Overall	10.6	N/A

OTHER CHECKS:

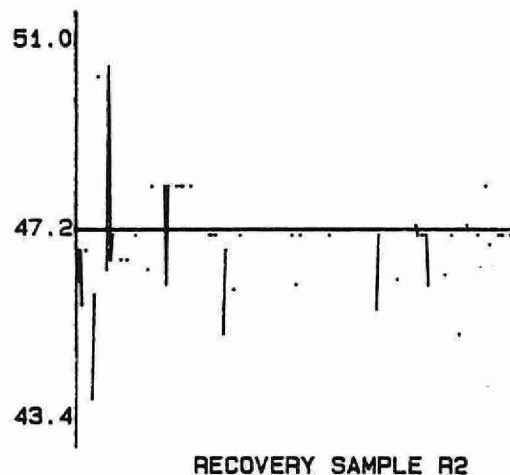
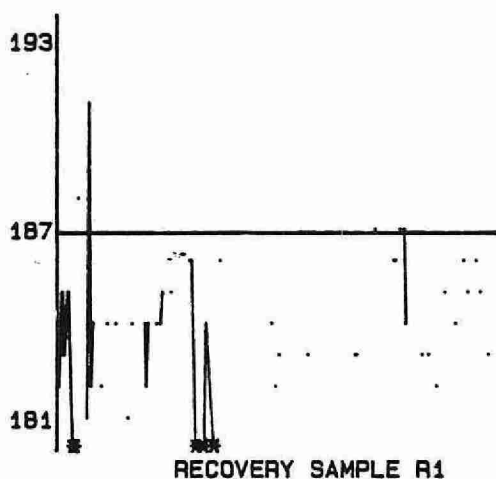
	Number of Data	Data Mean	Standard(1) Deviation
Blank :	160	0.16	0.207

QUALITY CONTROL GRAPHS SOLIDS - PARTICULATE (MG/L)

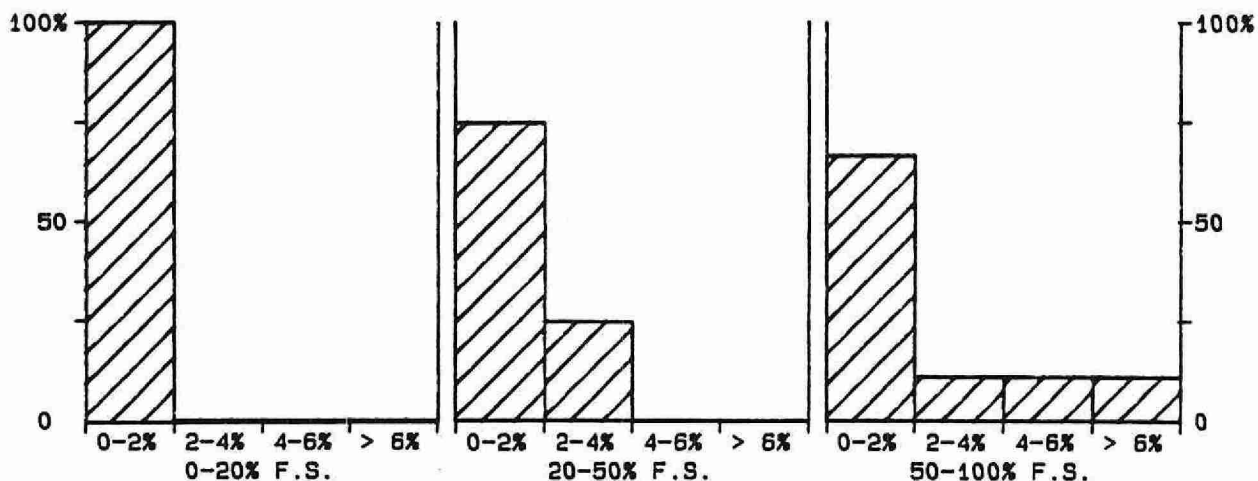
FROM: 06/01/87
TO: 07/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

*** SOLIDS - TOTAL ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '81
LIS Test Name Code	: RST	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: P. Campbell
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents, Sludge		

SAMPLING:

Quantity Required : 75-125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

A 50.0 or 100 mL aliquot of sample is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing, the total residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

- Balance (4/5-decimal places), drying oven, Teflon dishes
- Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 2 S class weights, e.g. QCA for each balance (results in grams)
Recovery : BL plus 2 standards, e.g. R1
Drift : Balance zero is checked at least 4 times daily

MODIFICATIONS:

15/01/82 -Microcomputer control was introduced.
01/07/85 -Teflon dishes replaced ceramic dishes and aliquot volume was increased to 100 mL where the expected result was below 1000 mg/L.
01/12/86 -Correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in calculation.

NOTES:

Determination of the detection is difficult because the test is rarely requested on low level samples.

SOLIDS - TOTAL
QUALITY CONTROL DATA FROM 05/01/87 TO 31/12/87

Lab: Solids

Analytical Range: 46 to 60000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	162	50.0004	50.0003	-0.0001	0.00008
b :	162	30.0001	30.0000	-0.0001	0.00007
a+b :	162	80.0005	80.0004	-0.0001	0.00011
a-b :	162	20.0003	20.0003	0.0000	0.00010

s.d.(AB): Sw(within run): 0.00007 S(between runs): 0.00008 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

80.000 to 80.000 for A+B
 20.000 to 20.000 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	26	20000	20026	71.8
r2 :	27	2000	2002	6.9

DUPLICATES:

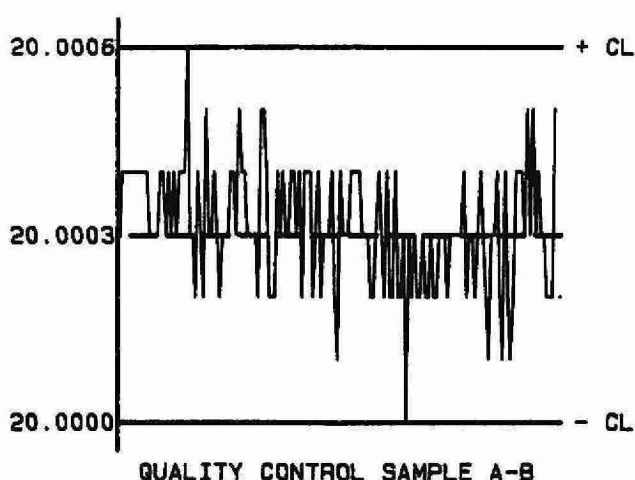
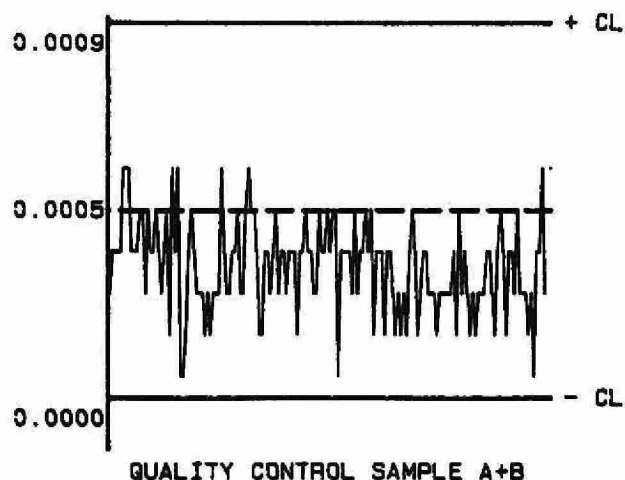
	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	13	0 - 2000	9.2	1.8
	7	2000 - 10000	98.9	1.8
	19	10000 - 20000	75.7	0.5
	21	20000 - 40000	492.2	1.7
	10	40000 - 60000	350.7	0.7
	70	Overall	304.6	N/A

OTHER CHECKS:

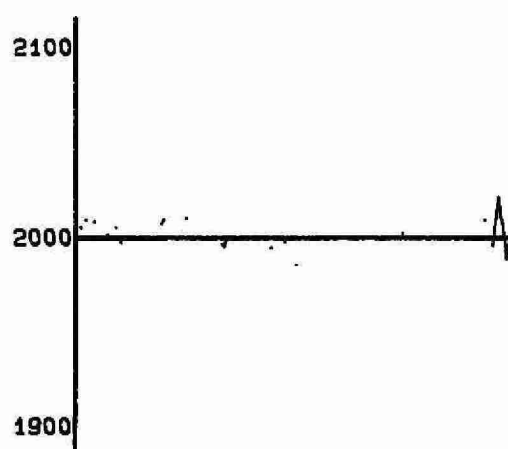
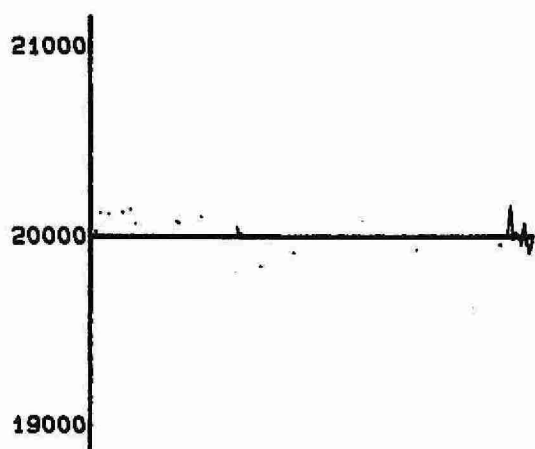
	Number of Data	Data Mean	Standard(1) Deviation
Blank :	52	1.50	2.571

QUALITY CONTROL GRAPHS SOLIDS - TOTAL (MG/L)

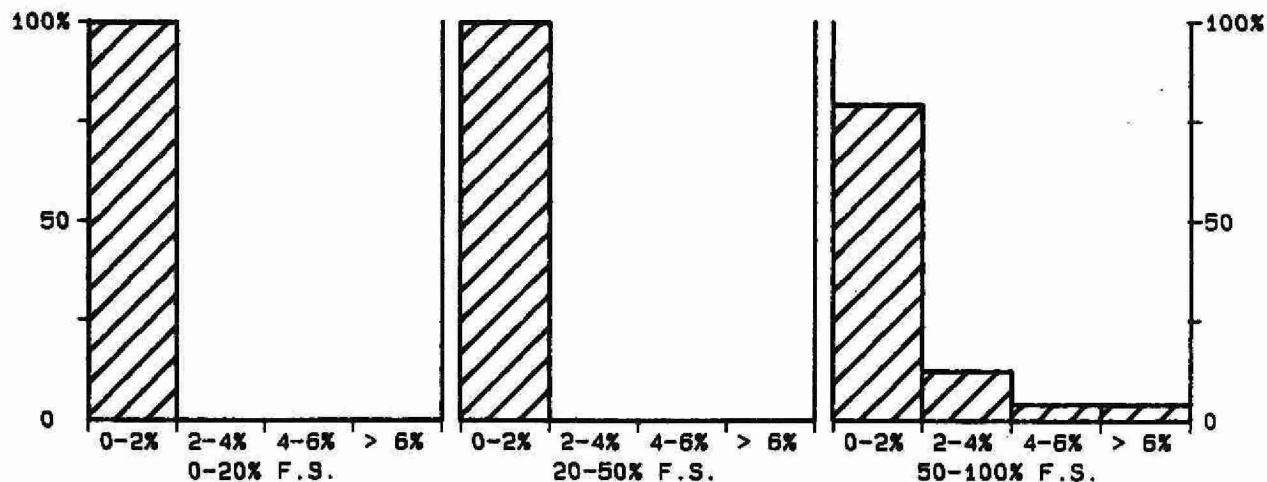
FROM: 05/01/87
TO: 31/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 60000 MG/L

*** SULPHATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced : 01/07/80
LIS Test Name Code : SSO4FR,SSO4NF Units : ug/Filter as SO₄
Work Station Code : PRSEQ Unit Code : 361941
Method Code : 004AIO Supervisor : F. Tomassini
Sample Type/Matrix : Teflon and nylon filters from sequential filter packs and nylon filters from LoVol filter packs.

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans.

Results are converted to ug/filter as SO₄.

Full scale conductivity: 30 uS/cm.

N.B. Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of Teflon and nylon filter extracts by developing the above filter extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE
QUALITY CONTROL DATA FROM 02/01/87 TO 22/12/87

Lab: Ion Chromatography

Analytical Range: 5 to 250 ug/Filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	50	200	201	1	1.6
b :	50	50	50	0	1.4
a+b :	50	250	250	0	1.8
a-b :	50	150	151	1	2.3

s.d.(AB): Sw(within run): 1.6 S(between runs): 1.5 S/Sw: 0.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

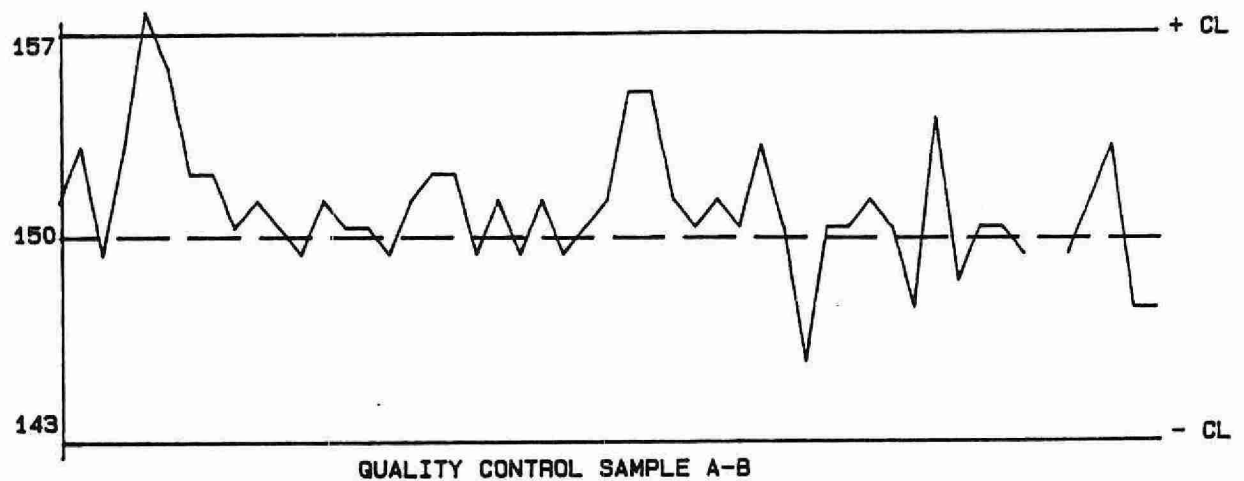
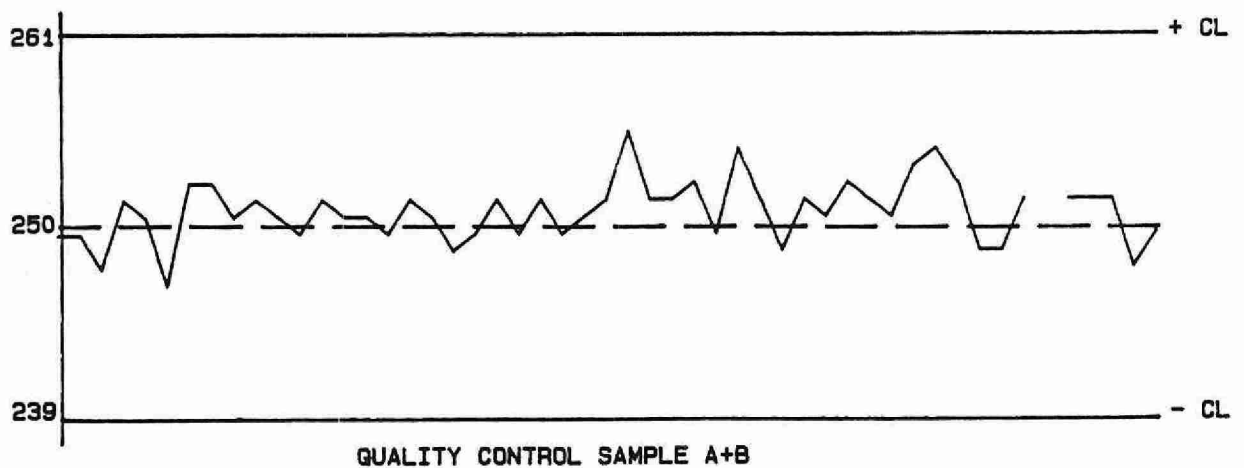
239 to 261 for A+B
 143 to 157 for A-B

DUPLICATES:

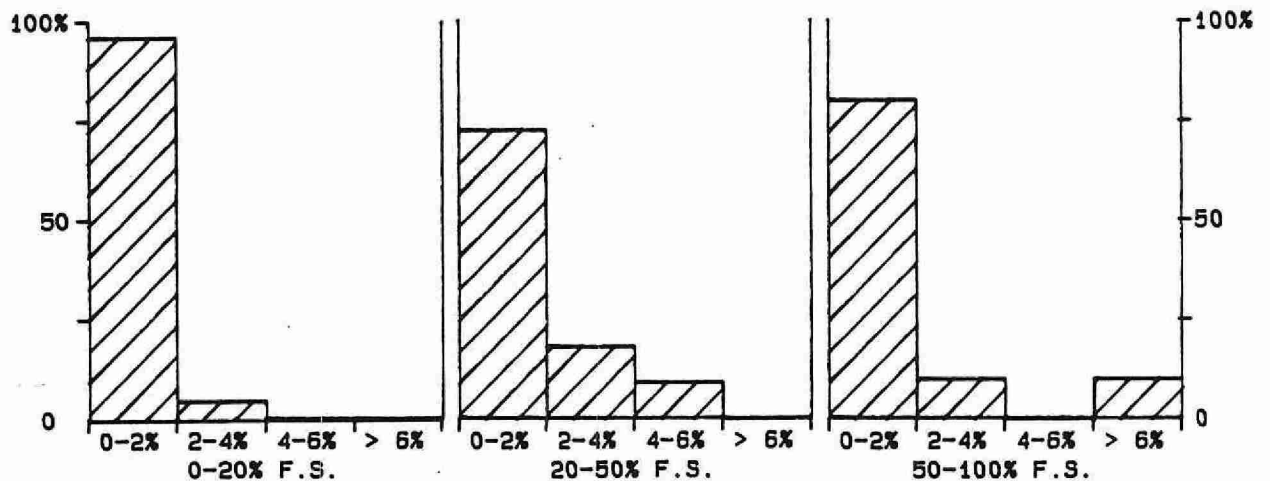
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
50	0 - 25	1.1	10.5
19	25 - 50	2.6	6.9
11	50 - 125	3.6	4.2
7	125 - 250	13.1	7.8
87	Overall	4.2	N/A

QUALITY CONTROL GRAPHS SULPHATE (UG/FILTER AS S04)

FROM: 02/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 250 UG/FILTER AS S04

***** SULPHATE - PRECIPITATION *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO ₄
Work Station Code	: PRIC1	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Tomassini
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Full scale conductivity: 10 uS/cm.
N.B. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3	Current W value: 0.05	T value: 0.25
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CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

MODIFICATIONS:

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.

SULPHATE
QUALITY CONTROL DATA FROM 06/01/87 TO 30/12/87

Lab: Ion Chromatography

Analytical Range: 0.16 to 10.00 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	86	8.00	8.02	0.02	0.142
b :	86	2.00	2.00	-0.00	0.055
a+b :	86	10.00	10.02	0.02	0.169
a-b :	86	6.00	6.02	0.02	0.132

s.d.(AB): Sw(within run): 0.093 S(between runs): 0.108 S/Sw: 1.15

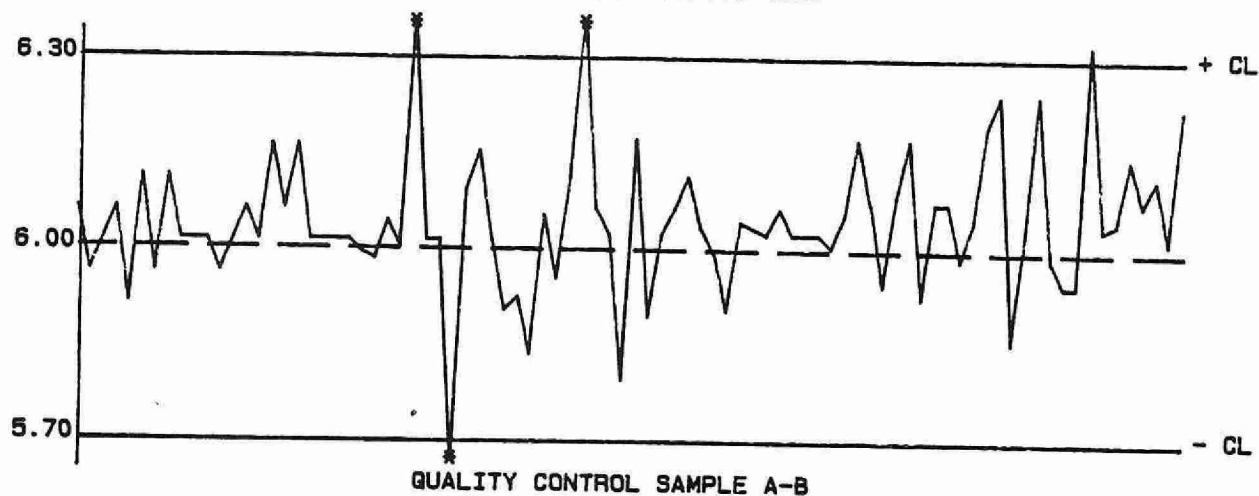
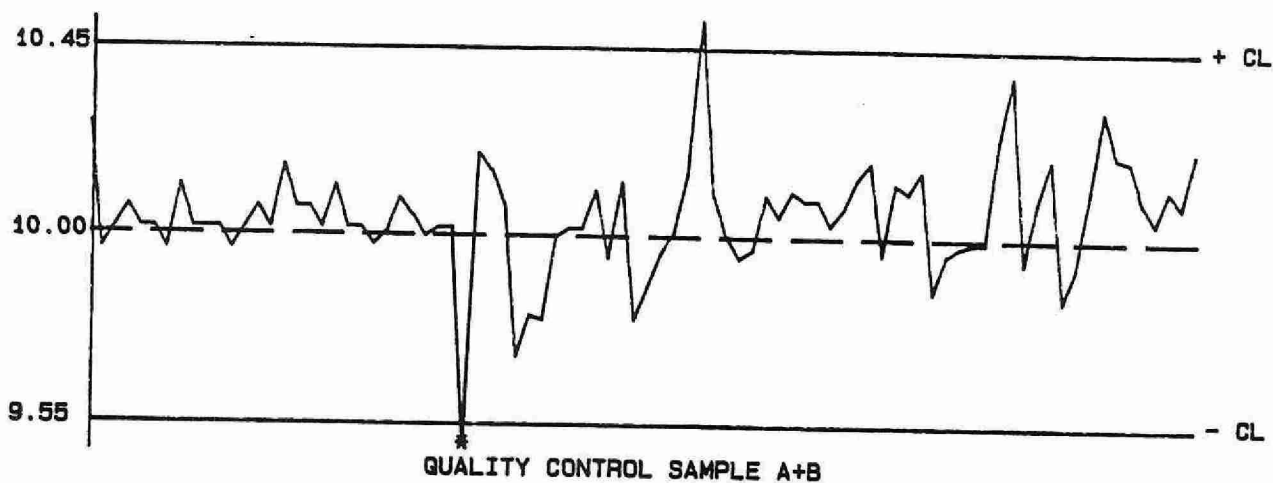
On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55 to 10.45 for A+B
5.70 to 6.30 for A-B

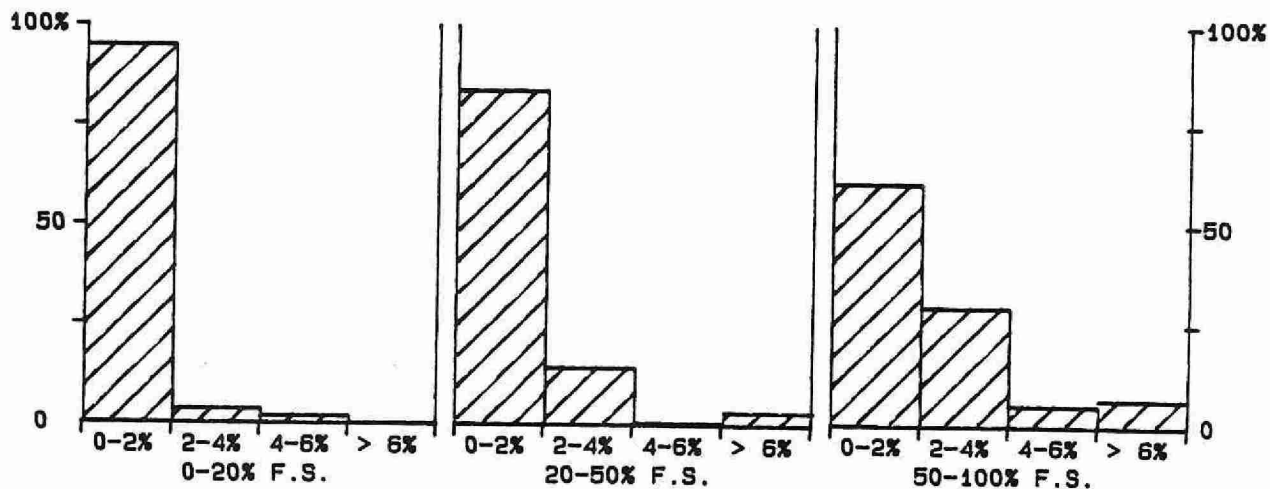
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	29	0.00 - 1.00	0.032	8.3
	29	1.00 - 2.00	0.093	6.1
	36	2.00 - 5.00	0.250	8.2
	60	5.00 - 10.00	0.187	2.5
	154	Overall	0.173	N/A

QUALITY CONTROL GRAPHS SULPHATE (MG/L AS SO₄)

FROM: 06/01/87
TO: 30/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS SO₄

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SS04UR	Units	: ug/Filter as SO ₄
Work Station Code	: PRLOV	Unit Code	: 361941
Method Code	: 004AIC	Supervisor	: F. Tomassini
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL Polyethylene Tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO₄.

Full scale conductivity: 30 uS/cm.

N.B. Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/08/81 -Ion chromatographic procedure for precipitation samples was modified for analysis of LoVol W40 filter extracts by developing the above filter extraction procedure.
10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.
10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.
No data summary available for period not covered in performance report.

SULPHATE
QUALITY CONTROL DATA FROM 02/01/87 TO 22/12/87

Lab: Ion Chromatography

Analytical Range: 3 to 500 ug/Filter as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
	-----	-----	-----	-----	-----
a :	23	400	400	0	3.3
b :	23	100	100	0	1.6
a+b :	23	500	500	0	3.6
a-b :	23	300	300	0	3.8

s.d.(AB): Sw(within run): 2.7 S(between runs): 2.6 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

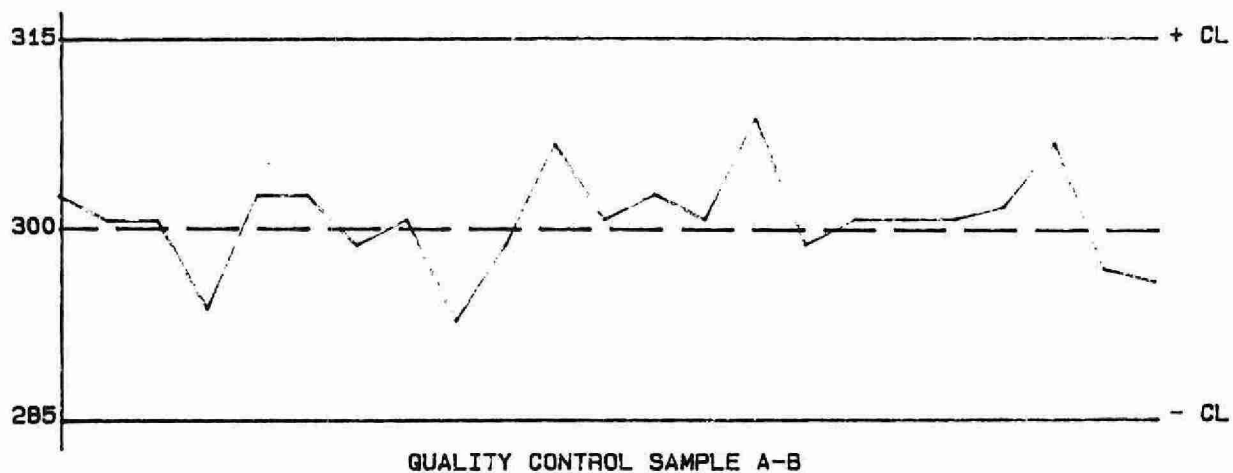
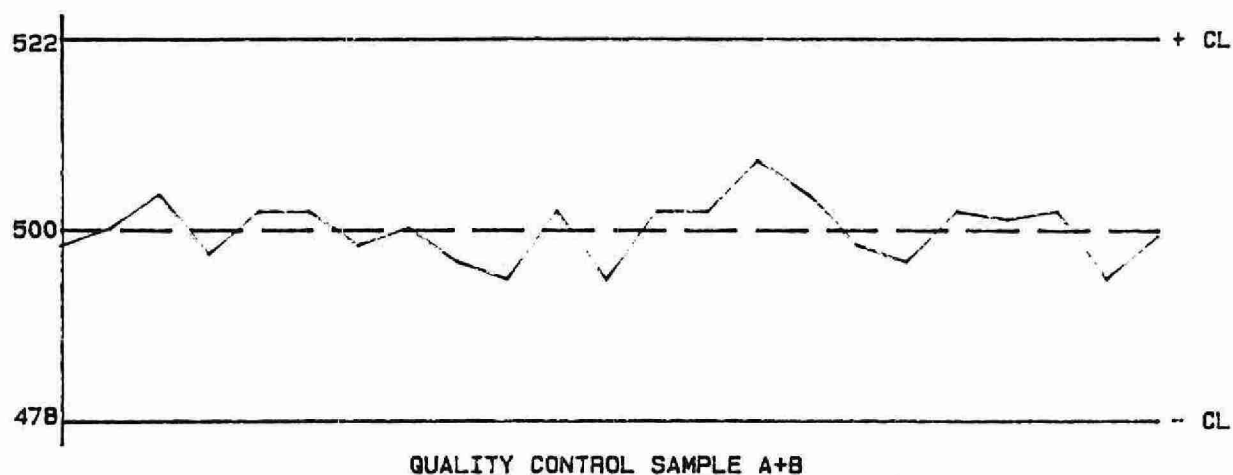
478 to 522 for A+B
 285 to 315 for A-B

DUPLICATES:

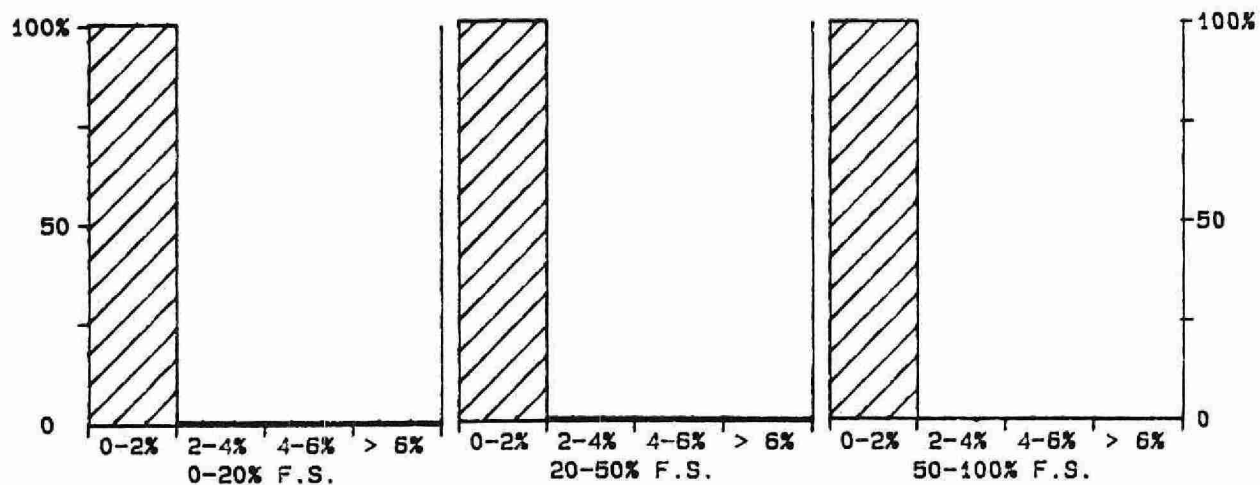
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
-----	-----	-----	-----
14	0 - 50	0.7	4.3
3	50 - 100	1.3	1.6
4	100 - 250	1.5	1.0
5	250 - 500	4.2	1.1
26	Overall	2.1	N/A

QUALITY CONTROL GRAPHS SULPHATE (UG/FILTER AS S04)

FROM: 02/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 UG/FILTER AS S04

***** SULPHATE *****

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/82
LIS Test Name Code	: SS04UR	Units	: mg/L as SO ₄
Work Station Code	: RMDSO4	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Tomassini
Sample Type/Matrix	: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic bottle

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.
Full scale conductivity: 100 uS/cm.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

NOTE: W and T values listed are for 200 and 20 mg/L instruments respectively.

CALIBRATION:

BL plus 13 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA
Drift : 2 standards

MODIFICATIONS:

01/04/82 -The sulphate procedure that was introduced differed slightly from Method B in HAMES: (1) full scale values for the analytical ranges were 20.0 and 50.0 mg/L, and (2) samples were not spiked with concentrated eluent. The latter was not necessary because only sulphate was measured and spiking is required for chloride analysis.

01/01/84 -Packed suppressor column was replaced by a fibre suppressor (walls of fibre are ion-exchange media). Full scale for high analytical was increased from 50.0 to 100 mg/L as SO₄; QC standards were adjusted accordingly. Analytical rate was doubled.

17/10/85 -Increase number of standards to 16 to ensure proper calibration at low end of analytical range.

24/04/86 -APIOS Dorset samples assigned to second system with full scale 20 mg/L as SO₄.

29/04/86 -Full scale increased from 100 to 200 mg/L as SO₄; QC standards were adjusted accordingly.

RMD904
QUALITY CONTROL DATA FROM 19/03/87 TO 23/12/87

Lab: Ion Chromatography

Analytical Range: 1.8 to 100.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	136	80.0	80.1	0.1	0.76
b :	136	20.0	19.7	-0.3	0.61
a+b :	136	100.0	99.8	-0.2	1.11
a-b :	136	60.0	60.4	0.4	0.81

s.d.(AB): Sw(within run): 0.57 S(between runs): 0.69 S/Sw: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

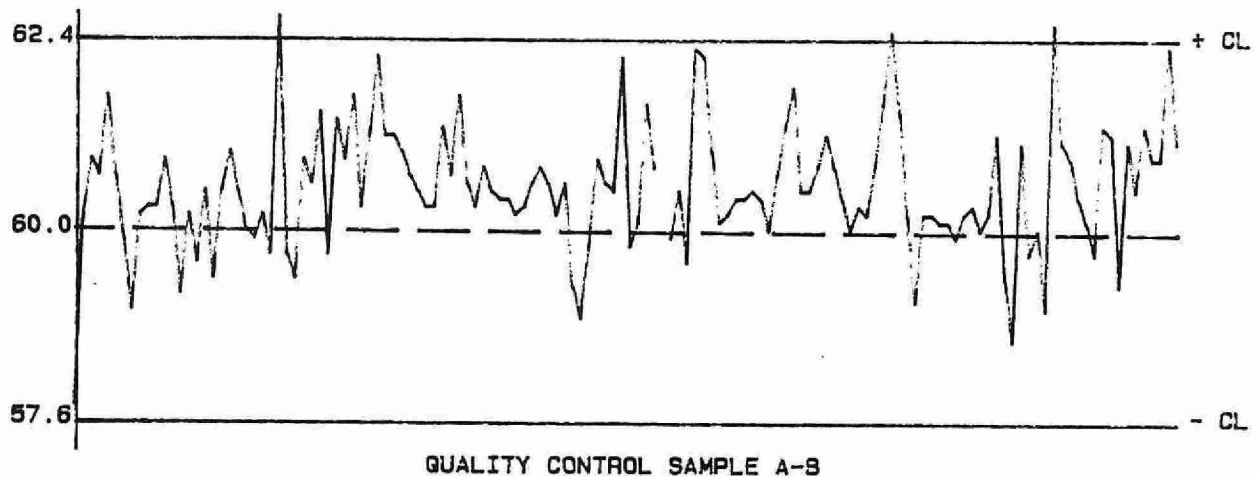
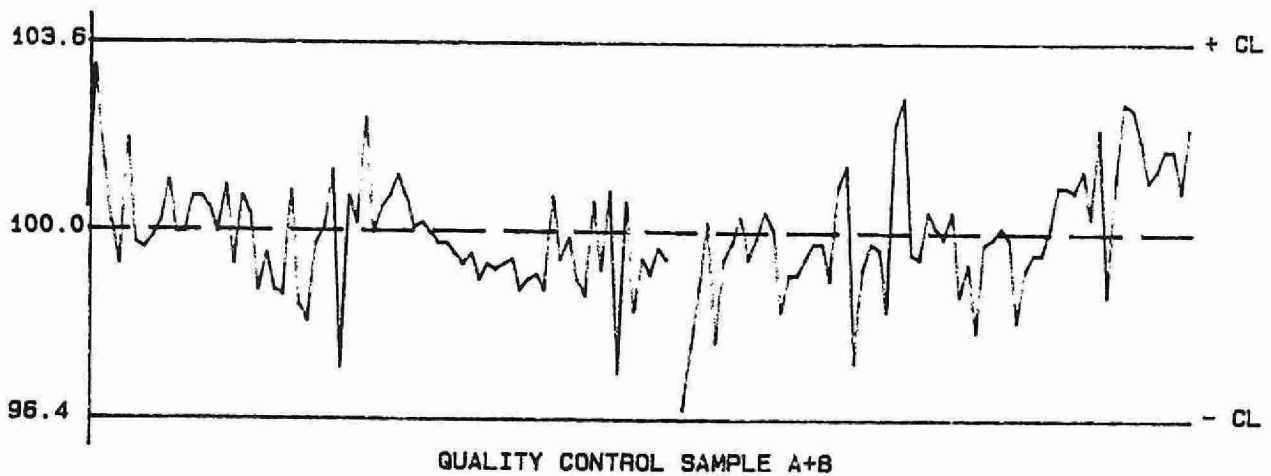
96.4 to 103.6 for A+B
 57.6 to 62.4 for A-B

DUPLICATES:

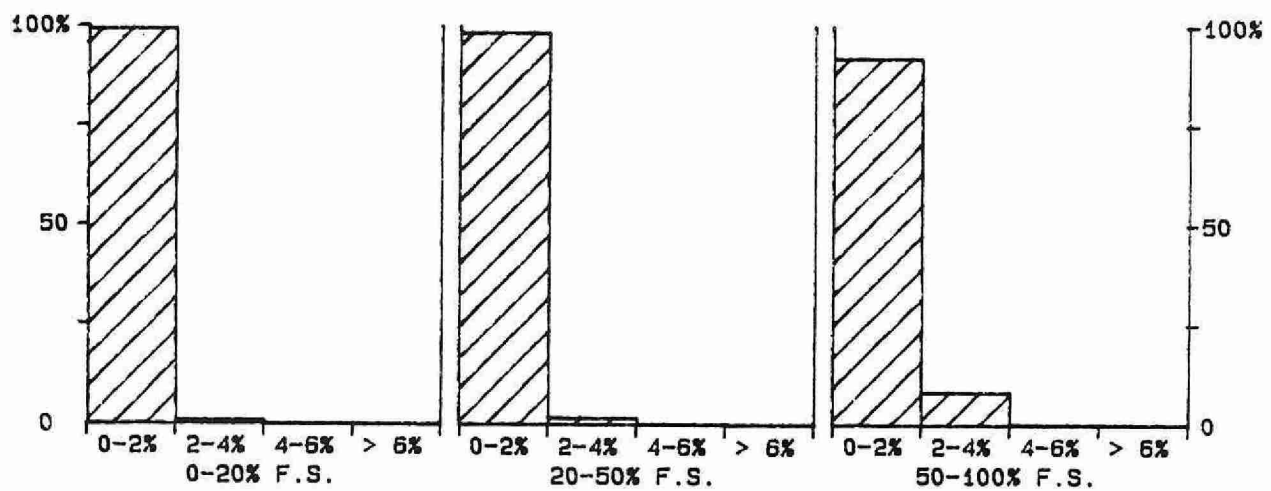
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
122	0.0 - 20.0	0.36	3.2
62	20.0 - 50.0	0.54	1.6
48	50.0 - 100.0	0.78	1.1
232	Overall	0.52	N/A

QUALITY CONTROL GRAPHS RMDSO4 (MG/L AS SO4)

FROM: 19/03/87
TO: 23/12/87



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL.



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS SO4

**** SULPHATE - SOIL (Xw) *****

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: SSO4EW	Units	: ug/g as SO ₄
Work Station Code	: DOANIONX	Unit Code	: 073941
Method Code	: 301AI5	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 10 g air dried
Container : Glass jars

SAMPLE PREPARATION:

Samples are air dried,disaggregated and sieved to <2 mm.

ANALYTICAL PROCEDURE:

Five grams of sample is agitated for 60 minutes with 25 mL deionized water. Samples are centrifuged and the supernatant is filtered through a 0.45 um membrane filter. Sulphate is determined on the filtrate by ion chromatography.

INSTRUMENTATION:

- Waters Model 430 Conductivity Detector
- Spectroflow 400 solvent delivery system
- Spectro-Physics SP780 XR autosampler
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 BL plus 2 standards, e.g. QCA
Recovery : 2 long term soil samples representing different soil types
 plus a round robin CSSC sample (run occasionally).
Drift : 100% full scale standard every 10 samples

MODIFICATIONS:

01/10/86 -Replacement of Wescan Ion Analyzer with equipment listed above (Wescan columns used on both systems).
01/06/86 -Agitation of samples increased from 30 minutes to 1 hour.

SULPHATE - WATER EXTRACTABLE
QUALITY CONTROL DATA FROM 07/04/87 TO 09/04/87

Lab: Dorset Soils

Analytical Range: 3.1 to 100.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	2	36.0	35.9	-0.1	0.57
b :	2	76.0	74.9	-1.1	1.98
a+b :	2	112.0	110.8	-1.2	2.55
a-b :	2	-40.0	-39.0	1.0	1.41

s.d.(AB): Sw(within run): 1.00 S(between runs): 1.46 S/Sw: 1.46

On any given day the calibration is accepted if the values obtained lie within the ranges:

104.5 to 113.5 for A+B
-45.0 to -35.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	2	55.0	59.4	2.62
r2 :	2	18.0	18.3	0.42

DUPLICATES:

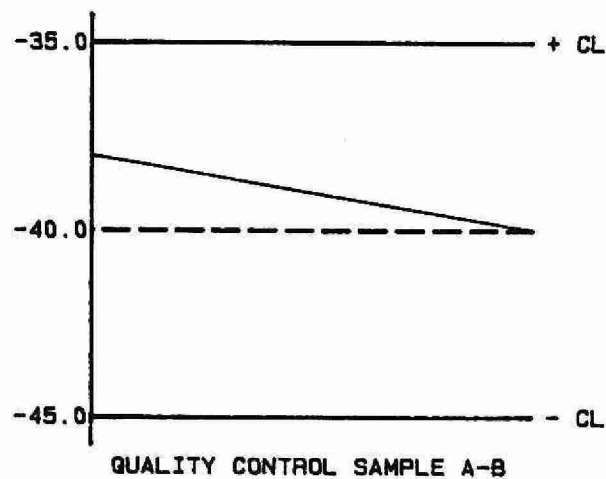
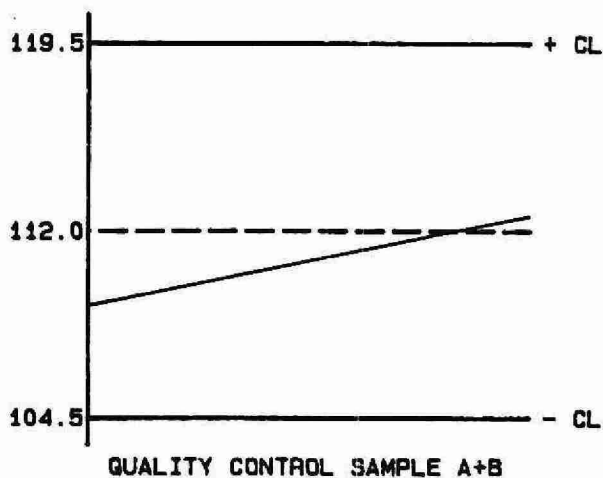
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
7	0.0 - 20.0	0.61	5.1
0	20.0 - 50.0	N/A	N/A
0	50.0 - 100.0	N/A	N/A
7	Overall	0.61	N/A

OTHER CHECKS:

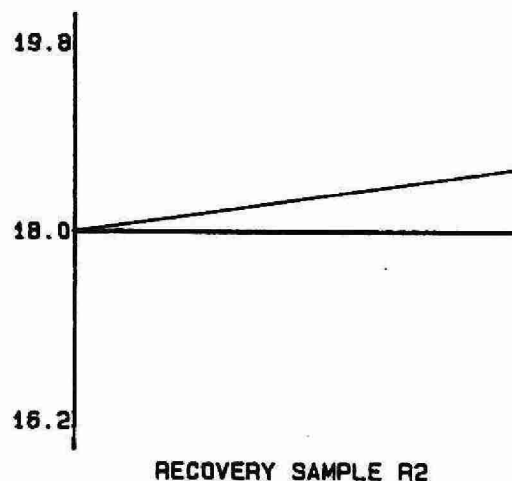
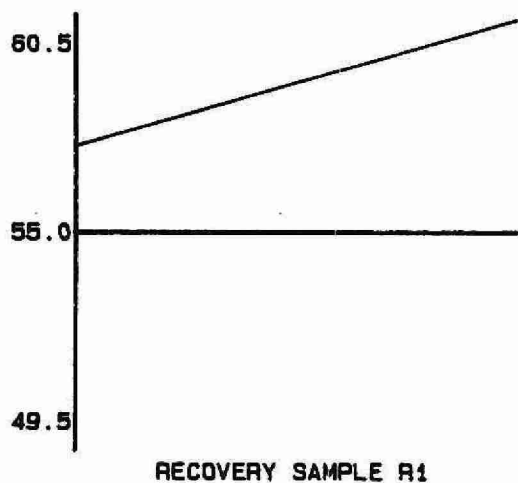
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS SULPHATE - WATER EXTRACTABLE (UG/G)

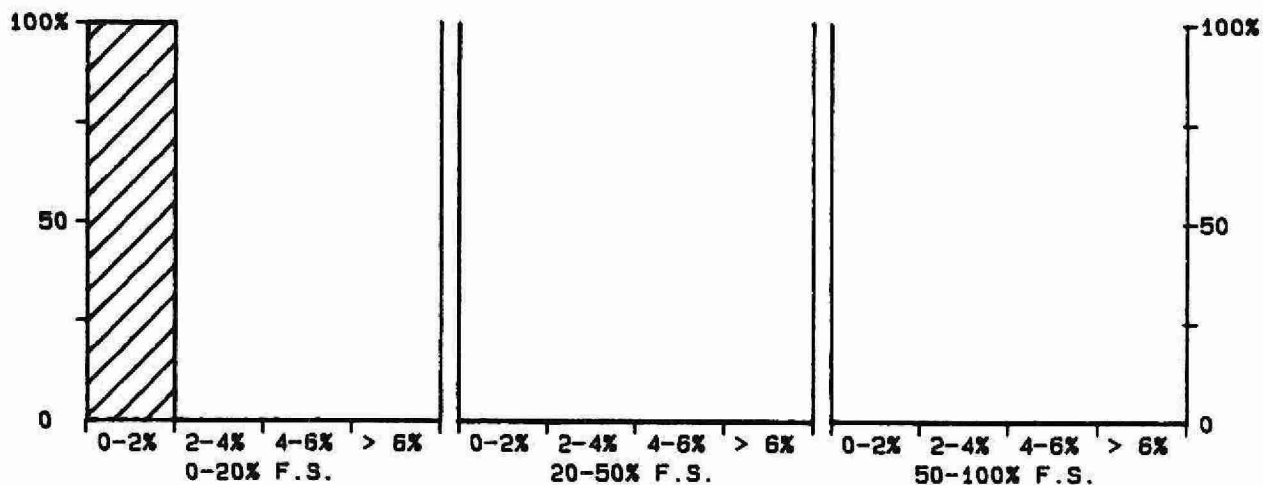
FROM: 07/04/87
TO: 09/04/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



FULL SCALE VALUE (F.S.): 100 UG/G

SULPHATE - WATER EXTRACTABLE
QUALITY CONTROL DATA FROM 10/04/87 TO 30/12/87

Lab: Dorset Soils

Analytical Range: 2.5 to 100.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	24	36.0	36.0	0.0	1.05
b :	24	76.0	76.1	0.1	0.94
a+b :	24	112.0	112.1	0.1	1.58
a-b :	24	-40.0	-40.1	-0.1	1.20

s.d.(AB): Sw(within run): 0.85 S(between runs): 1.00 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

104.5 to 119.5 for A+B
-45.0 to -35.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	22	55.0	56.2	2.62
r2 :	23	18.0	19.9	3.16

DUPLICATES:

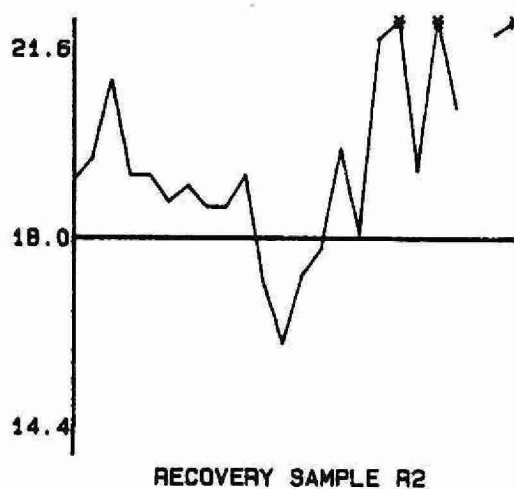
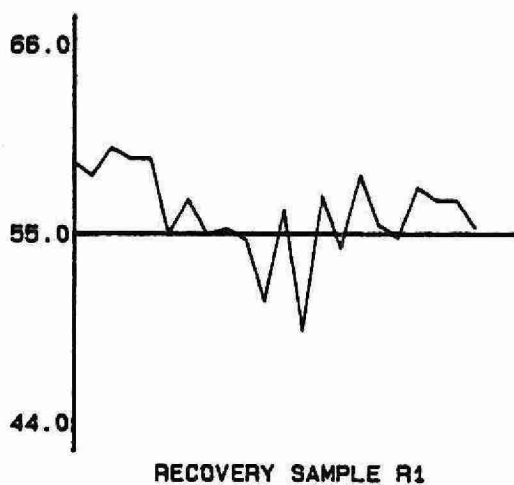
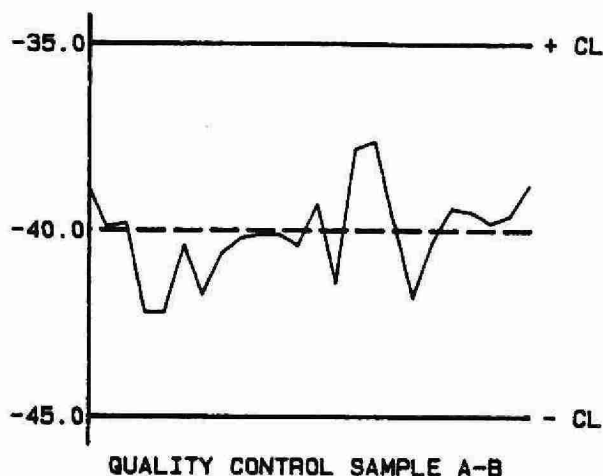
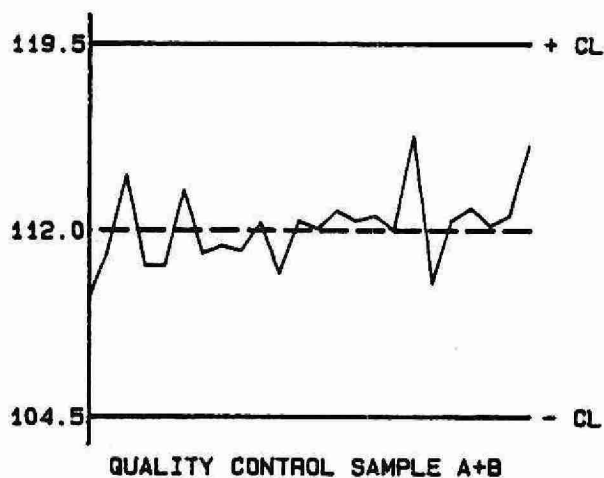
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
48	0.0 - 20.0	0.51	4.7
21	20.0 - 50.0	0.82	2.7
8	50.0 - 100.0	4.56	5.7
77	Overall	1.58	N/A

OTHER CHECKS:

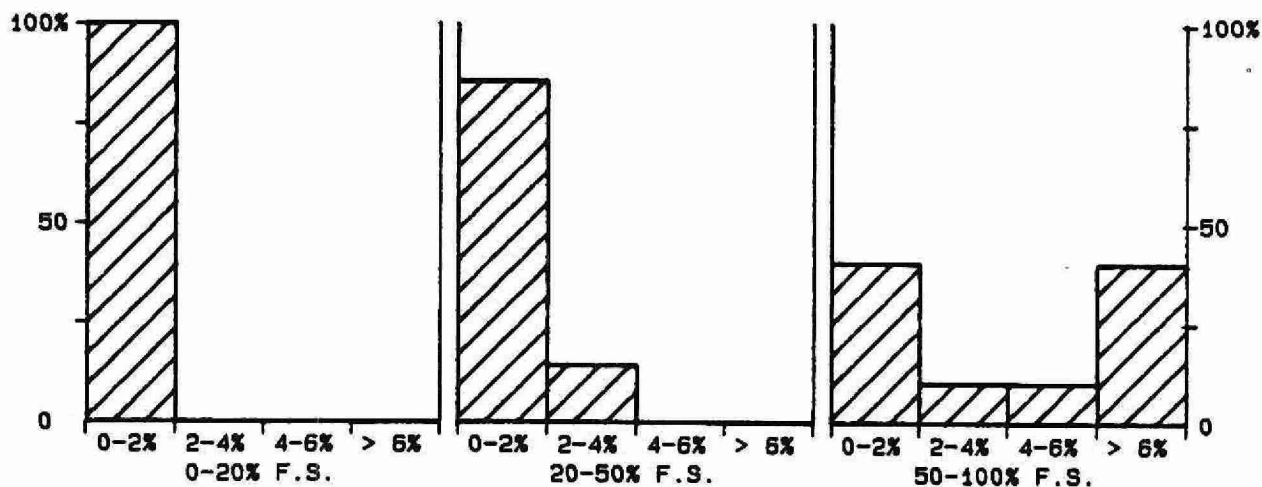
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	10	0.1	0.19

QUALITY CONTROL GRAPHS SULPHATE - WATER EXTRACTABLE (UG/G)

FROM: 10/04/87
TO: 30/12/87



* DATA > 15% OUTSIDE CL



*** SULPHUR DIOXIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SS02FR	Units	: ug/Filter as SO ₂
Work Station Code	: PRSEQ	Unit Code	: 361943
Method Code	: 004AI0	Supervisor	: F. Tomassini
Sample Type/Matrix	: Teflon and nylon filters from sequential filter packs and nylon filters from LoVol filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube
Other	: Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of 0.05% H₂O₂ in polyethylene tubes with one hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO₂ is converted to SO₄ in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the extract by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO₄ is determined by the comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO₂. Full scale conductivity: 30 uS/cm.

INSTRUMENTATION:

Mechanical shaker; ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system

REPORTING:

Maximum Significant Figures: 3	Current W value: 1.0	T value: 5.0
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CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of W41 filter extracts by developing the extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.

15/03/84 -Streamlined procedure for extraction of W41 filters in one 50 mL polyethylene tube was adopted, eliminating two container transfers, and changing the extraction volume to 50.0 mL from 100.0 mL. Full scale reduced from 700 to 350 ug/filter as SO₂.

SULPHUR DIOXIDE
QUALITY CONTROL DATA FROM 14/01/87 TO 22/12/87

Lab: Ion Chromatography

Analytical Range: 6.0 to 350 ug/Filter as SO₂

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	54	268	267	-1	3.0
b :	54	66	67	1	2.0
a+b :	54	334	333	-1	3.5
a-b :	54	202	200	-2	3.6

s.d.(AB): Sw(within run): 2.5 S(between runs): 2.5 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

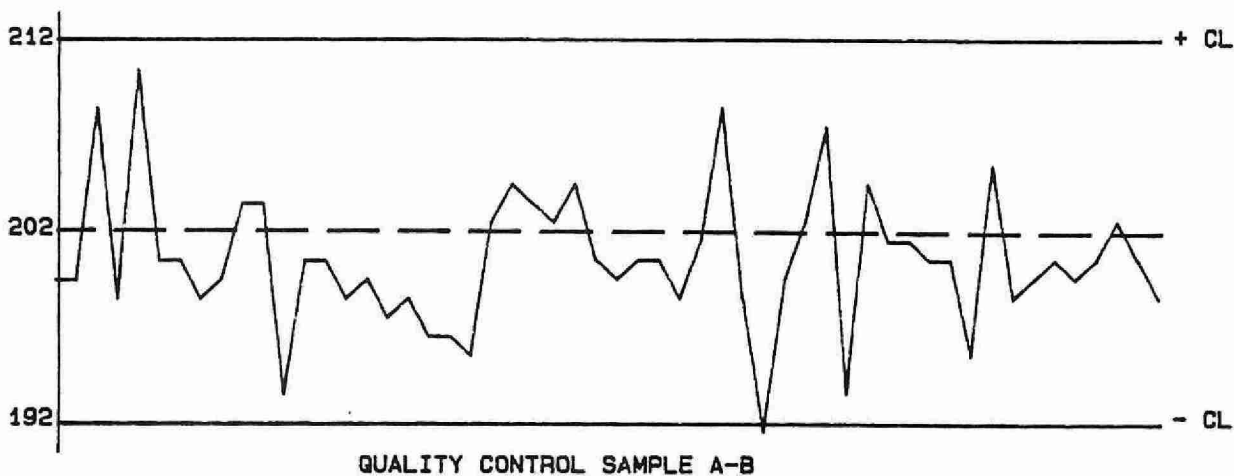
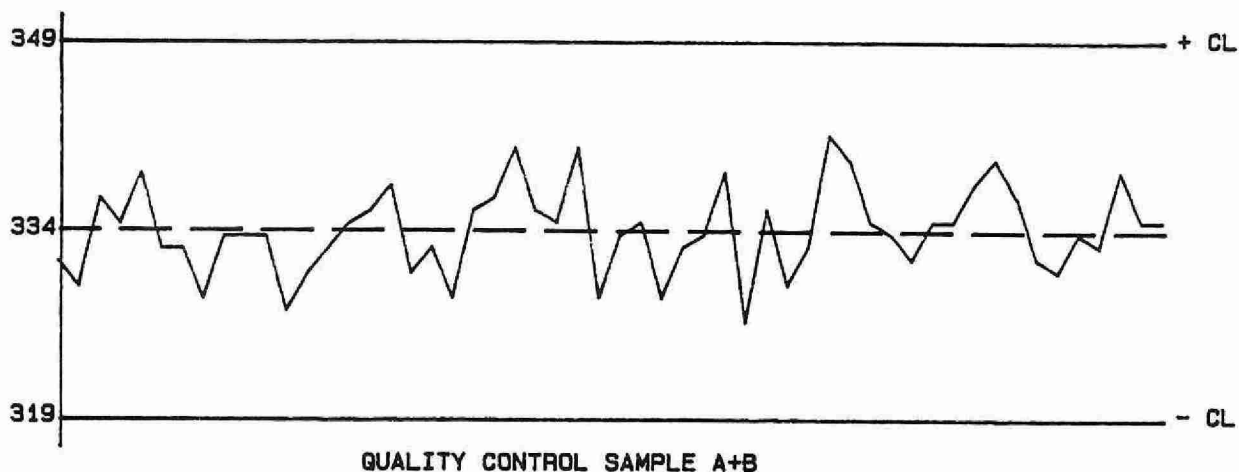
319 to 349 for A+B
 192 to 212 for A-B

DUPLICATES:

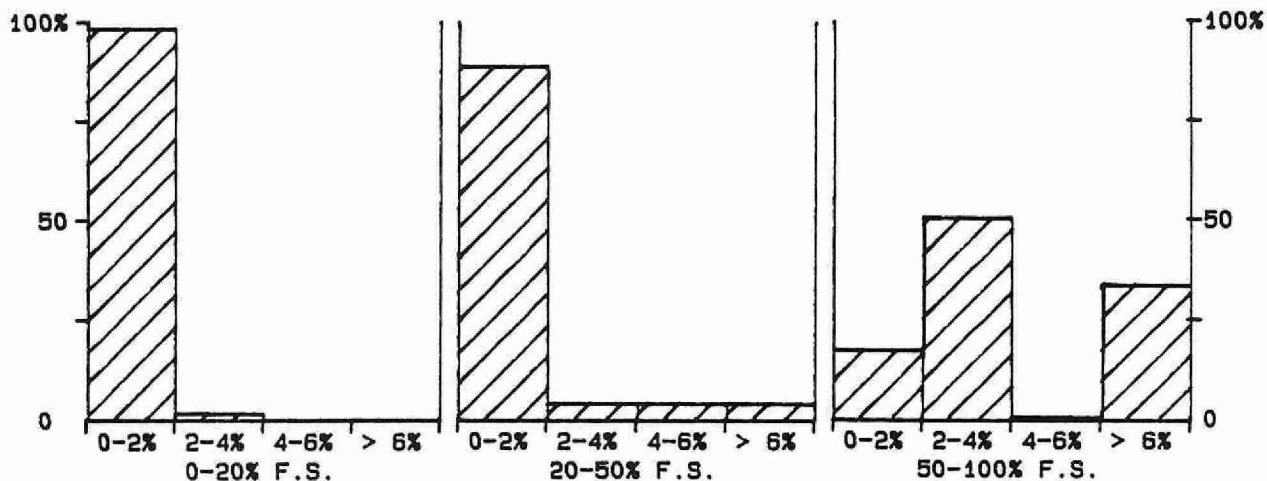
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
43	0.0 - 35.0	1.20	18.5
16	35.0 - 70.0	1.59	3.0
26	70.0 - 175.0	4.88	4.4
5	175 - 350	19.4	7.5
90	Overall	5.4	N/A

QUALITY CONTROL GRAPHS SULPHUR DIOXIDE (UG/FILTER AS SO₂)

FROM: 14/01/87
TO: 22/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 350 UG/FILTER AS SO₂

*** TURBIDITY ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: 01/04/74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: RMTURB	Unit Code	: 343000
Method Code	: 002AI1	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with a sealed standard which is prepared commercially from latex polymers of known size and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA

MODIFICATIONS:

01/04/82 -Hach 2100A turbidimeter was replaced by Hach ratio turbidimeter. As of this date samples are no longer stirred during turbidity measurements, and thus the effect of heavy particulates is minimized as they settle out before the reading is accepted.

01/09/85 -Controls QCA, QCB introduced: these controls are aqueous suspensions of beads composed of styrene-divinylbenzene polymer and are formulated to "match" the performance of formazin standards on the Hach 18900 turbidimeter.

*Insufficient data collected for inclusion in performance report.

18/08/87-New controls (QCA,QCB) were introduced: these consisted of ultrafine metal oxide particulates suspended in a silicone polymer gel. These secondary standards,"Gelex-TM" from Hach, were supported by the instrument manufacturer and provided similar results to the previous controls.

TURBIDITY - RIVER
QUALITY CONTROL DATA FROM 06/01/87 TO 31/12/87

Lab: Titration

Analytical Range: 0.37 to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	129	18.0	18.1	0.1	0.39
b :	129	1.80	1.88	0.08	0.053
a+b :	129	19.80	20.03	0.23	0.412
a-b :	129	16.20	16.27	0.07	0.368

s.d.(AB): Sw(within run): 0.26 S(between runs): 0.28 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

18.60 to 21.00 for A+B
 15.40 to 17.00 for A-B

DUPLICATES:

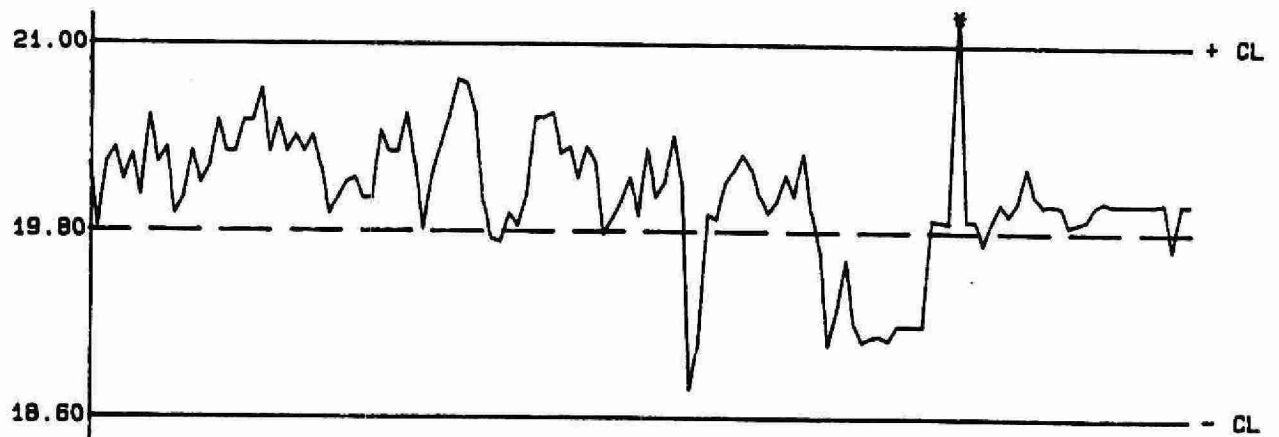
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
90	0.00 - 2.00	0.073	6.1
172	2.0 - 20.0	0.39	5.6
24	20 - 100	0.9	2.1
4	100 - 200	1.1	0.7
290	Overall	0.4	N/A

OTHER CHECKS:

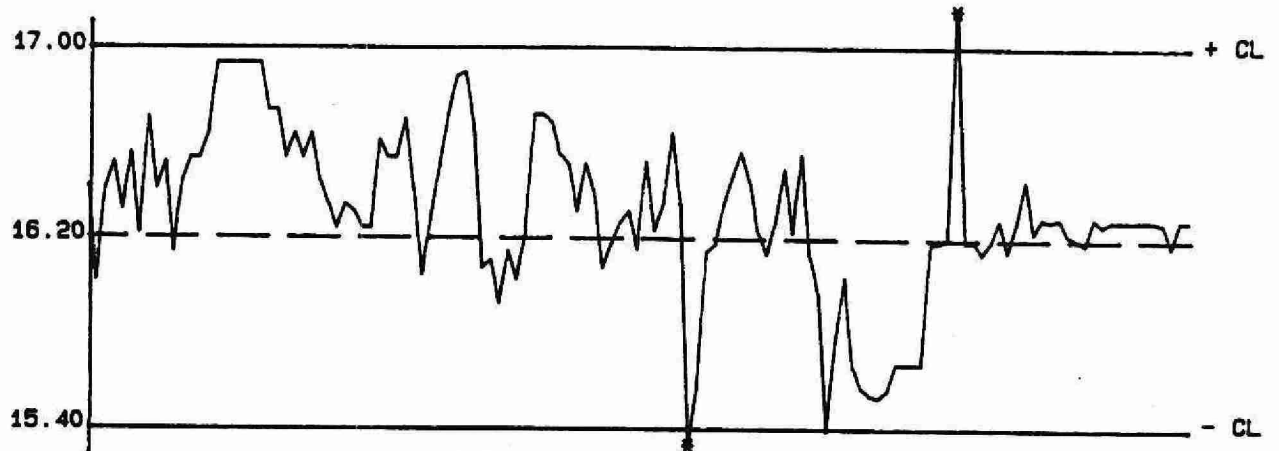
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	126	0.08	0.111

QUALITY CONTROL GRAPHS TURBIDITY - RIVER (FTU)

FROM: 06/01/87
TO: 31/12/87

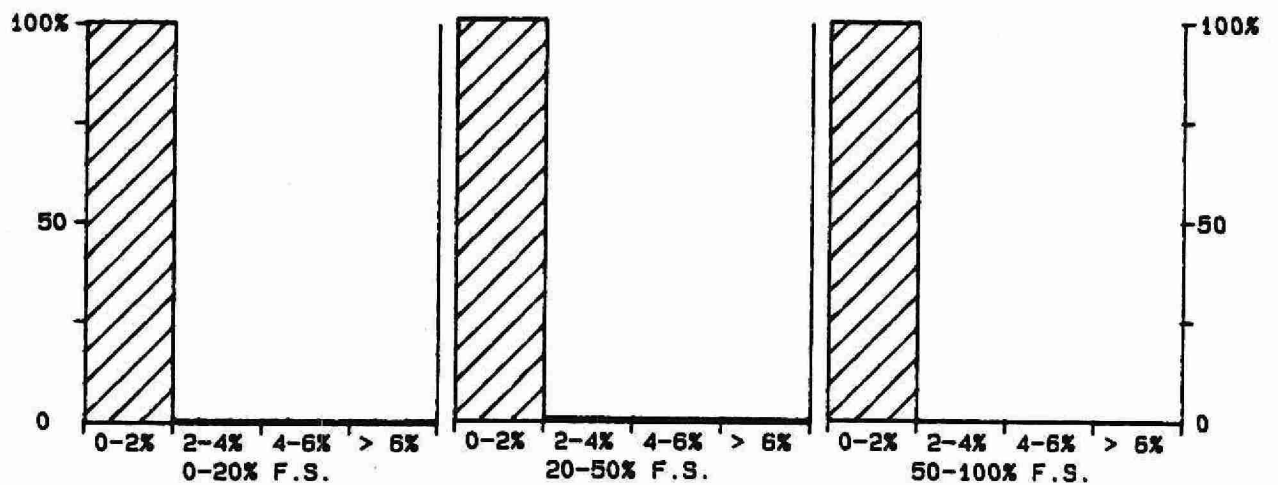


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 FTU

***** TURBIDITY *****

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: WTURB	Unit Code	: 343000
Method Code	: 002AI1	Supervisor	: P. Campbell
Sample Type/Matrix	: Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required : 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized periodically with freshly prepared formazin standards. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA*

MODIFICATIONS:

01/03/84 -Hach 2100A turbidimeter was replaced by Hach ratio turbidimeter. In the past samples were not stirred during turbidity measurements in the Domestic Water laboratory even though the former instrument (Hach 2100A) possessed this capability. Thus the effect of changing the instrumentation was minimal.

01/09/85 -Controls QCA, QCB introduced: these controls were aqueous suspensions of beads composed of styrene-divinylbenzene polymer and are formulated to "match" the performance of formazin standards on the Hach 18900 turbidimeter.

*Insufficient data collected for inclusion in performance report.

TURBIDITY - WATER
QUALITY CONTROL DATA FROM 05/01/87 TO 24/12/87

Lab: Titration

Analytical Range: 0.44 to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	139	18.0	18.2	0.2	0.25
b :	139	1.80	1.83	0.03	0.040
a+b :	139	19.80	20.08	0.28	0.267
a-b :	139	16.20	16.41	0.21	0.230

s.d.(AB): Sw(within run): 0.16 S(between runs): 0.18 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

18.60 to 21.00 for A+B
 15.40 to 17.00 for A-B

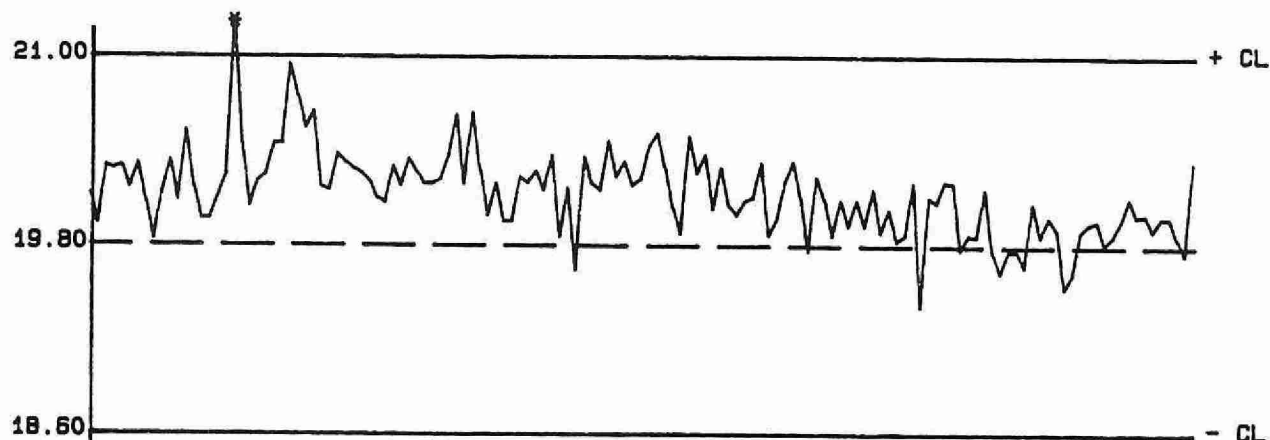
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	185	0.00 - 2.00	0.087	14.8
	72	2.0 - 20.0	0.36	5.4
	14	20 - 100	1.2	3.1
	2	100 - 200	2.1	1.6
	273	Overall	0.4	N/A

OTHER CHECKS:

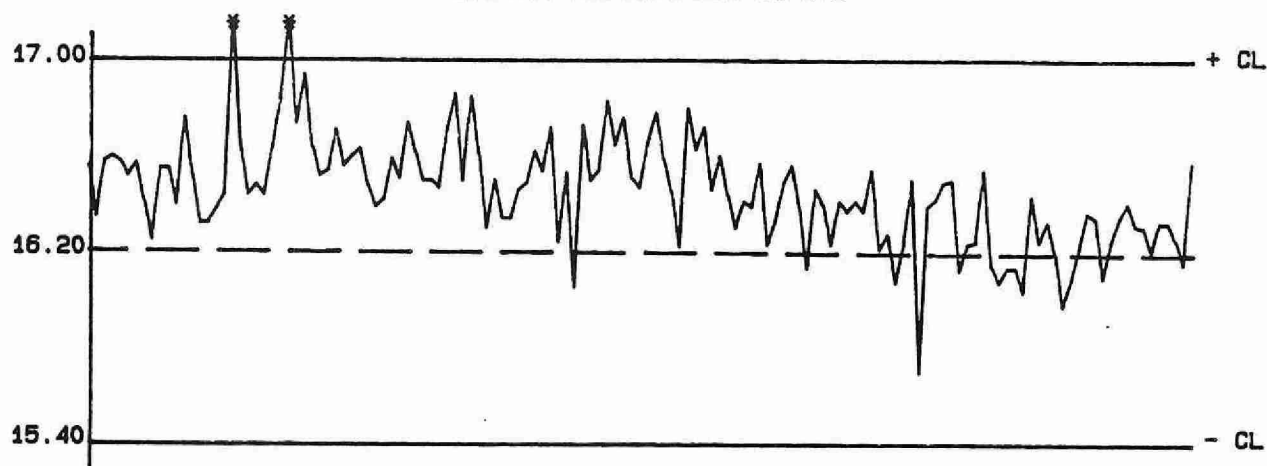
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	139	0.06	0.027

QUALITY CONTROL GRAPHS TURBIDITY - WATER (FTU)

FROM: 05/01/87
TO: 24/12/87

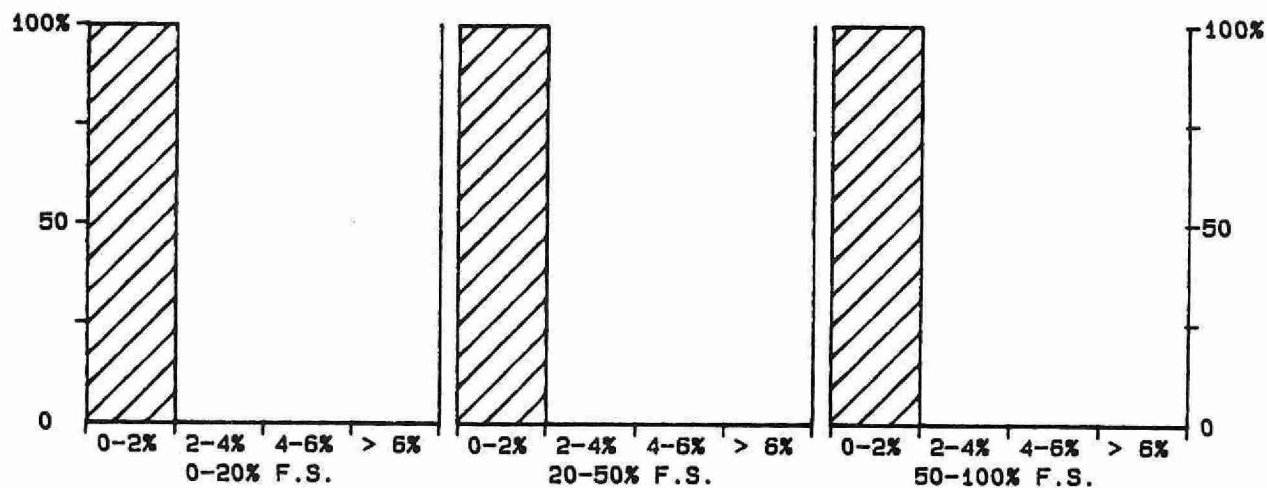


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 FTU

*** TOTAL ZINC - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced	: 01/06/80
LIS Test Name Code	: ZNUT	Units	: ug/g as Zn
Work Station Code	: DOHMTE	Unit Code	: 073830
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix	: Soil		

SAMPLING:

Quantity Required : 1 g dry
Container : Glass vial

SAMPLE PREPARATION:

Samples are air dried and ground to <150 μm .

ANALYTICAL PROCEDURE:

A 0.500 g sample plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125°C for 2 hours. The temperature is increased to 175°C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Zn by AAS at 217.0 nm using an air-acetylene flame. Approximate absorbance: 0.3 at the full scale value. Copper, nickel and zinc are also determined on the extract.

INSTRUMENTATION:

- Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
- Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples

Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160°C to 175°C
06/01/86 -Samples analyzed on Varian AAS1275 (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown - average value used.

TOTAL ZINC - SOIL
QUALITY CONTROL DATA FROM 09/02/87 TO 01/12/87

Lab: Dorset Soils

Analytical Range: 4.1 to 100.0 ug/g as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	79.0	78.9	-0.1	1.00
b :	8	30.0	30.3	0.3	1.46
a+b :	8	109.0	109.2	0.2	1.75
a-b :	8	49.0	48.5	-0.5	1.79

s.d.(AB): Sw(within run): 1.27 S(between runs): 1.25 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

101.5 to 116.5 for A+B
44.0 to 54.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	23	36.1	35.6	2.29
r2 :	23	82.1	80.9	3.41
r3 :	23	38.5	39.1	1.93

DUPLICATES:

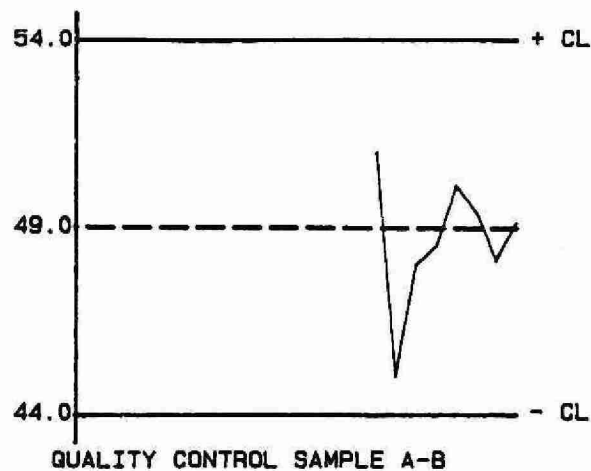
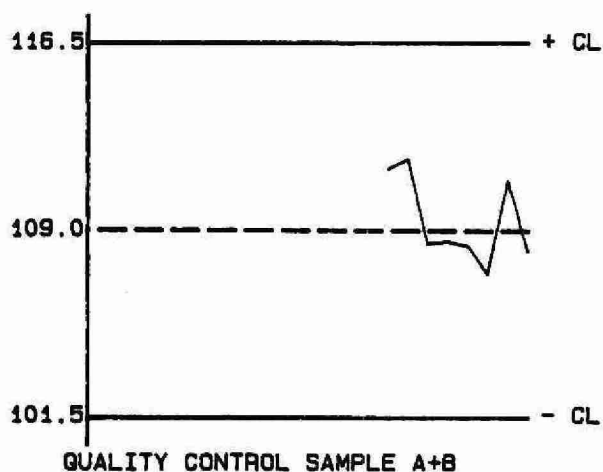
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
8	0.0 - 20.0	0.83	5.4
29	20.0 - 50.0	1.79	5.1
26	50.0 - 100.0	2.41	3.4
63	Overall	1.99	N/A

OTHER CHECKS:

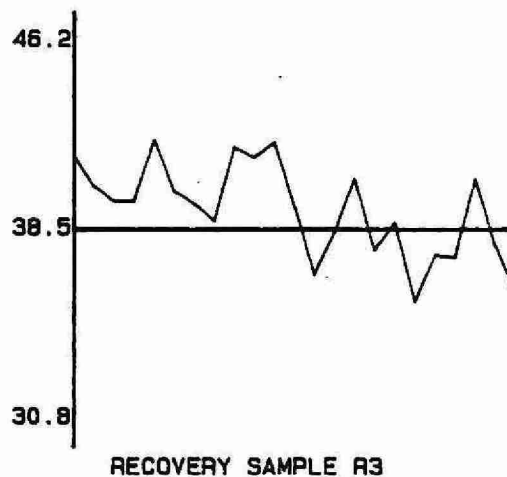
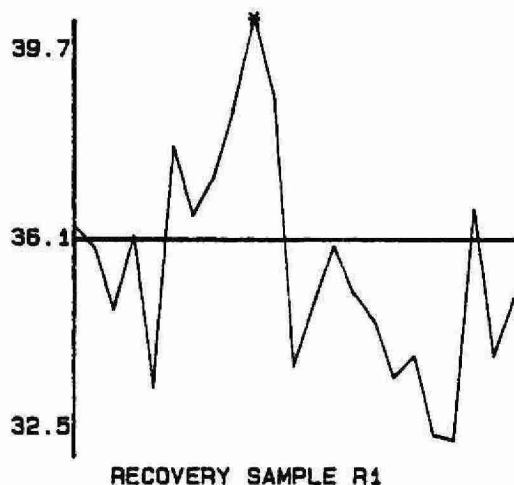
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	23	1.2	1.51

QUALITY CONTROL GRAPHS TOTAL ZINC - SOIL (UG/G AS ZN)

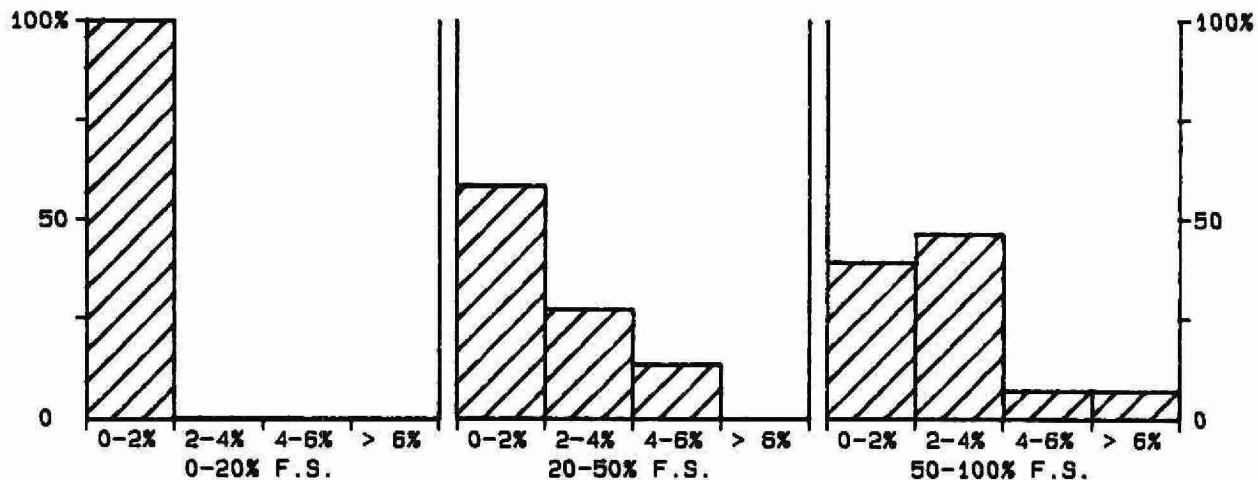
FROM: 09/02/87
TO: 01/12/87



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/G AS ZN

***** ZINC *****

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/03/86
LIS Test Name Code	: ZNUT	Units	: ug/L as Zn
Work Station Code	: DOASV	Unit Code	: 063830
Method Code	: 001PP2	Supervisor	: F. Tomassini
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 100 mL
Container	: 500 mL, acid washed Telfon container, bagged in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.1% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when zinc is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

Metrohm 646 VA Processor with Model 675 VA Sample Changer.

REPORTING:

Maximum Significant Figures: 3	Calculated W value: 0.5	T value: 2.5
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CALIBRATION:

BL plus 2 standards daily

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA + EPA standard.
Duplicate	: End of every run (approximately every 8 samples)

ZINC - TOTAL
QUALITY CONTROL DATA FROM 17/02/87 TO 22/12/87

Lab: Dorset

Analytical Range: 1.66 to 15.00 ug/L as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	82	8.00	8.67	0.67	2.368
b :	82	2.00	2.64	0.64	0.794
a+b :	82	10.00	11.31	1.31	2.652
a-b :	82	6.00	6.03	0.03	2.332

s.d.(AB): Sw(within run): 1.649 S(between runs): 1.766 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

-0.50 to 20.50 for A+B
-1.00 to 13.00 for A-B

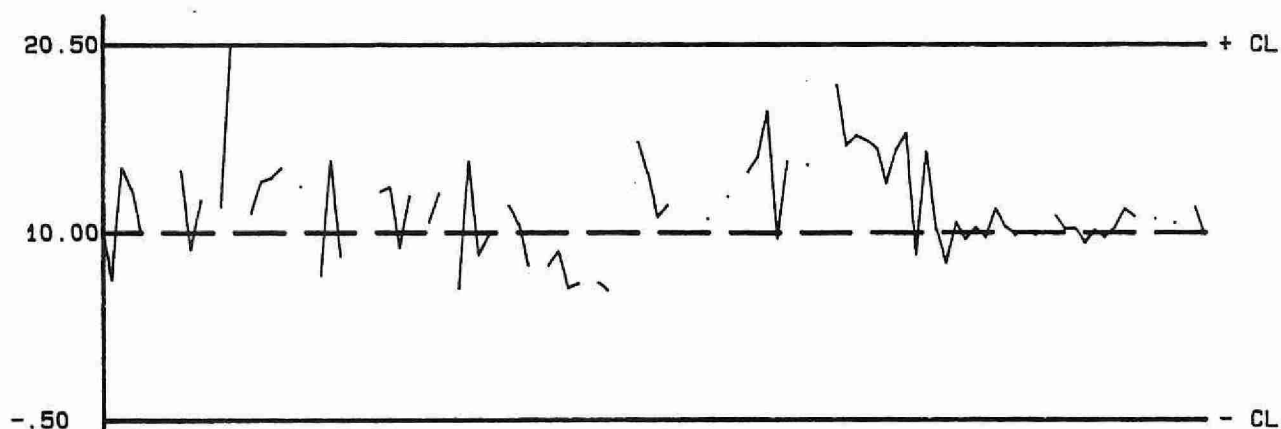
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	20	0.00 - 1.00	0.332	237.7
	9	1.00 - 3.00	1.186	56.4
	5	3.00 - 5.00	0.728	18.5
	14	5.00 - 10.00	1.524	22.8
	6	10.00 - 15.00	3.646	28.1
	54	Overall	1.550	N/A

OTHER CHECKS:

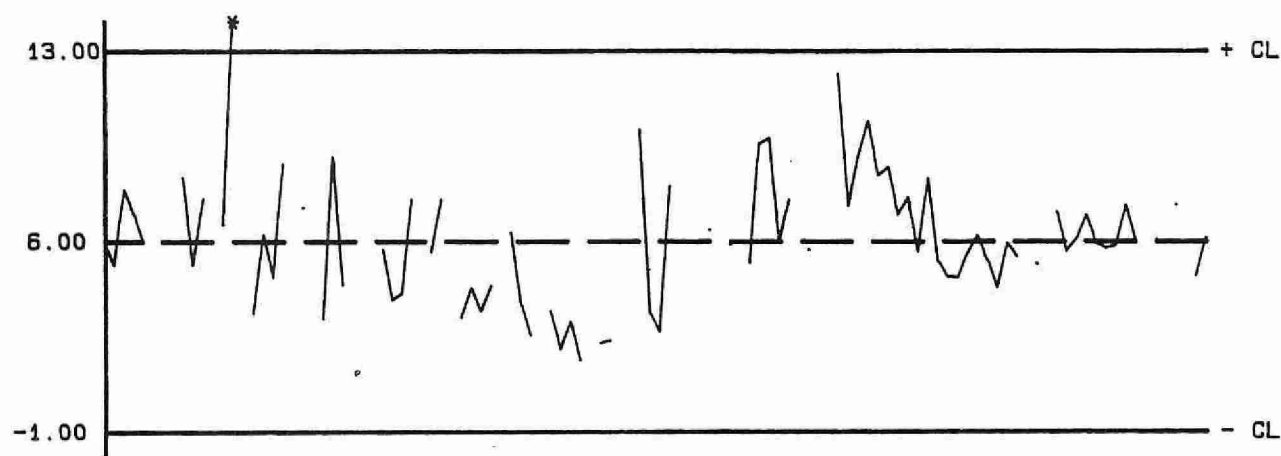
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	77	0.24	0.487

QUALITY CONTROL GRAPHS ZINC - TOTAL (UG/L AS ZN)

FROM: 17/02/87
TO: 22/12/87

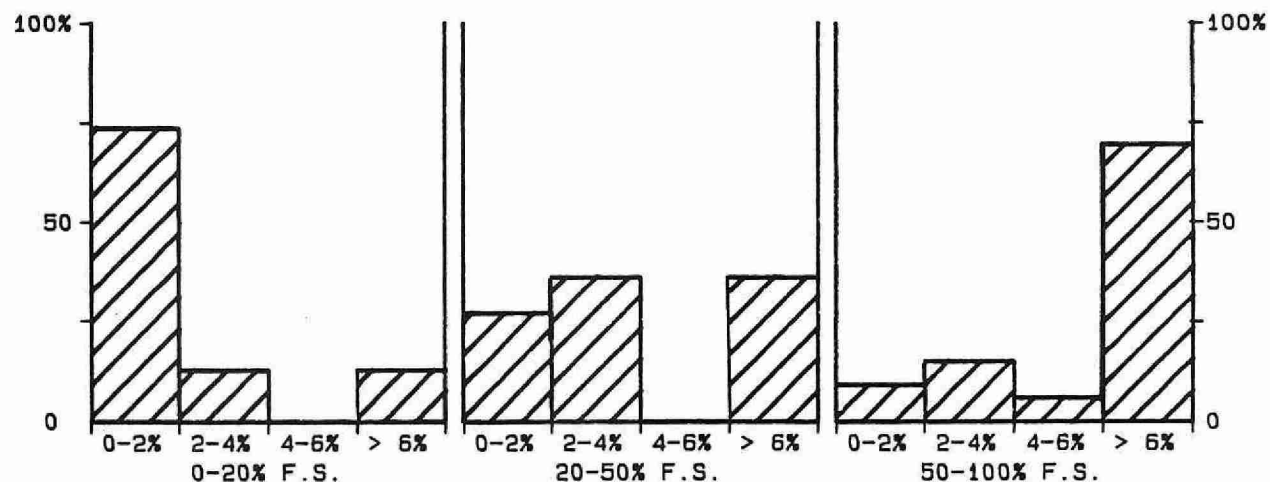


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 UG/L AS ZN

METHOD SUMMARIES
MICROBIOLOGY

*****ESCHERICHIA COLI*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1979
LIS Test Name Code	: ECMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TFC 24	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hour at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a caketete) with 2 Pharol jars containing ice (50 mL of water), one placed at each end of the caketete. After incubation the membrane filter is transferred to a pad soaked in urease reagent and is given a reaction time of 15 minutes. All colonies that were yellow on mTEC agar and remain yellow on urease are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

*****ESCHERICHIA COLI*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1, 1986
LIS Test Name Code	: ECMMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TGM 24	Supervisor	: M. Young
Sample Type/Matrix	: Waste Waters eg. Pulp and Paper effluent.		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC MUG agar and incubated for 21 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a caketete) with 2 Pharol jars containing ice (50 mL of water), one placed at each end of the caketete. Under UV light (long wave 366nm) all blue fluorescent colonies are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

FECAL COLIFORMS

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: 1979
	: Municipal Drinking Water		
LIS Test Name Code	: FCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
	: WQMFPFA		
Method Code	: TF1 24	Supervisor	: M. Young
			: J. Clark
Sample Type/Matrix	: Surface, Waste and Drinking Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a cakette) with 2 Pharol jars containing ice (50 mL of water), one placed at each end of the cakette. All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

FECAL COLIFORMS

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1986
LIS Test Name Code	: FCMMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: TGM 24	Supervisor	: M. Young
Sample Type/Matrix	: Waste Waters eg. Pulp and Paper effluent.		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC MUG agar and incubated for 21 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a caketete) with 2 Pharol jars containing ice (50 mL of water), one placed at each end of the caketete. After the E. coli count is determined the filters are removed from mTEC MUG agar and placed onto mTEC agar. The plates are reincubated at 44.5° C for 1 hour (no ice is required). All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target oraganism count on selective vs nonselective medium.
	: Comparson of target counts on an old vs a new batch.

MODIFICATIONS:

None.

*****FECAL STREPTOCOCCUS*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: Apr. 1972
LIS Test Name Code	: FSMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: EF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mEnterococcus agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are red, maroon or pink are counted as fecal streptococcus. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.
Medium QC : Target organism count on selective medium vs non selective medium.
: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

HETEROTROPHS

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1978
LIS Test Name Code	: HB20	Units	: Counts/mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: CS 07	Supervisor	: M. Young
Sample Type/Matrix	: Surface Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: Glass, 250 mL
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the spot plate procedure using aseptic technique. The sample and or dilution water are spotted directly onto the surface of dried CPS agar using a 0.1 mL volume per spot. Two spots per sample/dilution are required and a total of four spots may be placed onto the medium surface. Care must be taken that the working surface is flat and the plates are not moved to prevent the spots from running together. All colonies are counted as heterotrophs and the reported count is the average of the two spots. An ideal counting range is 10 to 75 colonies per spot.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC : Colony counts are obtained using a pure culture and comparing the heterotrophic medium (CPS) to the nonselective medium (BHIA).
: Comparison of target counts on an old vs a new batch are done using water samples.

MODIFICATIONS:

None.

*****HETEROTROPHS*****

IDENTIFICATION:

Laboratory	:	Surface and Waste Water	Method Introduced	:	1979
	:	Municipal Drinking Water			
LIS Test Name Code	:	HB35MF	Units	:	Counts/mL
Work Station Code	:	MSBACIND	Unit Code	:	301532
	:	WQMFPFA			
Method Code	:	SF 48	Supervisor	:	M. Young
				:	J. Clark
Sample Type/Matrix	:	Drinking Water			

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mSPC1 agar and incubated for 48 +/- 3 hours at 35 +/- 0.5°C to allow for colony development. All colonies are counted as heterotrophs. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC :Colony counts are obtained using a pure culture and comparing the heterotrophic medium (mSPCI) to the nonselective medium (BHIA).
:Comparison of colony counts on an old vs a new batch are done using water samples.

MODIFICATIONS:

None.

*****KLEBSIELLA SPP.*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: June 1986
LIS Test Name Code	: KLMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: KF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mK2 agar and incubated for 42 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies that are yellow and greater than 0.75 mm are counted as Klebsiella spp. An ideal counting range is 10 to 50 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC : Target organism count on selective medium vs nonselective medium.
: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

PRESENCE-ABSENCE TEST

IDENTIFICATION:

Laboratory	: Municipal Drinking Water	Method Introduced	: 1968
LIS Test Name Code	: PABOT	Units:Present/Absent/100mL	
Work Station Code	: WQMFPFA	Unit Code	: 999000
Method Code	: LLSB10	Supervisor	: J. Clark
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

A 100 mL volume of sample is added to a presence-absence (P-A) bottle. The bottle is incubated at 35°C for 4 to 5 days and examined every 24 hours for acid or acid and gas formation. When a positive reaction for acid or acid and gas occurs, the inoculum is transferred to confirmatory media to determine the presence of total coliforms, fecal coliforms and other indicator organisms.

REPORTING:

Microbiological parameters are reported either as present or absent per 100 mL of sample.

CONTROLS:

A blank control sample is included for every 20 to 25 samples.

Medium QC : P-A broth batches are checked for sterility at 20° and 35°C and inoculation of the medium is done with E. coli to determine its response. Dilutions of E. coli are passed through membrane filters which are subsequently placed on filter pads saturated with P-A broth and on an enrichment medium, such as Brain Heart Infusion Agar, to compare numbers of colonies recovered.

MODIFICATIONS:

Initially the P-A broth was formulated using MacConkey broth with tryptose as described in HAMES, June 1, 1976. Subsequently, a Lactose broth and Lauryl Tryptose broth formulation was described in HAMES, December 1983. A commercial preparation of this medium is now used, known as Presence-Absence broth. The latest revision of the P-A methodology was listed as WQPA-100 and was written up in early 1988.

*****PSEUDOMONAS AERUGINOSA*****

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1980
LIS Test Name Code	: PSAMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: PF 48	Supervisor	: M. Young
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required : 100 mL
Container : Glass, 250 mL
Preservative : Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mPA agar and incubated for 48 +/- 2 hours at 41.5 +/- 0.5°C to allow for colony development. All colonies that are dark brown, brown with darkened centers, tan and usually very flat in appearance are counted as Pseudomonas aeruginosa. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3 Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC : Target organism count on selective medium vs nonselective medium.
: Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

*****TOTAL COLIFORMS*****

IDENTIFICATION:

Laboratory	:	Surface and Waste Water	Method Introduced	:	Jan. 1971
	:	Municipal Drinking Water			
LIS Test Name Code	:	TCMF	Units	:	Counts/100mL
Work Station Code	:	MSBACIND	Unit Code	:	301532
	:	WQMFPFA			
Method Code	:	LF 22	Supervisor	:	M. Young
				:	J. Clark
Sample Type/Matrix	:	Surface Water,Drinking Water			

SAMPLING:

Quantity Required	:	100 mL
Container	:	Glass, 250 mL
Preservative	:	Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mENDO LES agar and incubated for 22 +/- 2 hours at 35 +/- 0.5°C to allow for colony development. All colonies with a dull to bright metallic green-gold sheen are counted as coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures:	3	Minimum Increment:	1
Detection Criteria:	10		

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	:	Target organism count on selective medium vs nonselective medium.
	:	Comparison of target counts on an old vs a new batch.

MODIFICATIONS:

None.

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GLOSSARY

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DW	- Distilled water
FTU	- Formazin Turbidity Units
g	- Gram
HAMES	- <i>"Handbook of Analytical Methods for Environmental Samples"</i> , M.O.E.
HOAC	- Acetic Acid
HZU	- Hazen Units
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
mil	- One-thousands of an inch
min	- Minute
mL	- Millilitre
mm	- Millimeter
N	- Normal
N/A	- Not Available or Not Applicable
nm	- Nanometer
oz	- Ounce
QC	- Quality Control
R	- Recovery
rpm	- Revolutions per minute
S	- Between run standard deviation for QC
S ₁	- Standard deviation
S ₂	- Standard deviation for duplicates

S_w	- Within run standard deviation for QC
S. class	- Weights that have not been certified
Standard Cal	- Colourimeter setting to control electronic expansion
STD	- Standard
TCU	- True Colour Units
μ	- Micrometer
μeq	- Microequivalent
μg	- Microgram
μS	- Micro-Siemen
V/V	- Concentration based on volume measurements

APPENDIX

APPENDIX A

W & T:

Prior to 1985, W was the minimum detectable amount, and T was 1.645 times the standard deviation of duplicates in a concentration range of about 0-20% of full scale. The W value was given to the client to indicate the smallest amount that could be determined when the actual response was zero. In 1985, T was changed to three times the standard deviation of the same duplicates (reference 3). W was changed only where the minimum amount had changed. The increase in T was made to be consistent with recommendations by the American Chemical Society (reference 8) and to provide a level, above which, data users could have more than 99% confidence that a result obtained was above zero.

W and T are low level data qualifiers assigned to data that are near or below the detection limit values. The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the smallest amount that could have been measured under routine conditions. W is smaller than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section now calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1, 2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active workstations, are contained in this report.

APPENDIX B

PARAMETER	UNITS	WORKSTATION CODE	TEST CODE	FULL SCALE	W	T
Acidity - Gran.....	mg/L CaCO ₃	DOT.....	ACDG.....	1000.....	5.....	25
	ueq/L as H.....	PHACD.....	ACDG.....	1000.....	1.....	5
Acidity - TFE.....	mg/L CaCO ₃	DOT.....	ACDT.....	50.....	0.2.....	1
		PHACD.....	ACDT.....	100.....	0.05.....	0.25
Alkalinity-Gran.....	mg/L CaCO ₃	DOT.....	ALKTI.....	25.....	0.05.....	0.25
		RATS.....	ALKTI.....	25.....	N/A.....	N/A
Alkalinity-TFE.....	mg/L CaCO ₃	DOT.....	ALKT.....	100.....	0.05.....	0.25
		RATS.....	ALKT.....	1000.....	0.2.....	1
		WATS.....	ALKT.....	1000.....	0.2.....	1
		WQSDIRT.....	ALKT.....	1000.....	0.5.....	2.5
Alk - TFE @3.8.....	mg/L CaCO ₃	DOT.....	ALKT3.....	100.....	0.05.....	0.25
Aluminum - Xca.....	ug/g as Al.....	DOSOLAL.....	ALECA.....	40.....	0.2.....	1.0
Aluminum - CV.....	ug/L as Al.....	DOMISC.....	ALEXCV.....	1000.....	2.....	10
			ALNOCV.....	1000.....	2.....	10
Aluminum - Xdi.....	% wt as Al.....	DOMETDI.....	ALEDI.....	1.....	0.01.....	0.05
Alumimum - Xpy.....	% wt as Al.....	DOMETALX.....	ALEPY.....	0.5.....	0.01.....	0.05
Aluminum - Xsc.....	meq/100g Al.....	DOCATION.....	ALESC.....	2.5.....	0.01.....	0.05
Aluminum-Total.....	ug/L as Al.....	DOAAS.....	ALUT.....	200.....	1.....	5
Cadmium-Total.....	ug/L as Cd.....	DOAAS.....	CDUT.....	2.....	0.01.....	0.05
Calcium.....	mg/L as Ca.....	PRAA.....	CAUR.....	2.....	0.02.....	0.1
		RMAAS.....	CAUR.....	40.....	0.1.....	0.5
		WAAS.....	CAUR.....	200.....	0.2.....	1
Calcium - Xca.....	meq/100g Ca.....	DOCATION.....	CAESC.....	5.....	0.01.....	0.05
Carbon-Diss Inor.....	mg/L as C.....	ROM.....	DIC.....	40.....	0.2.....	1
Carbon-Diss Org.....	mg/L as C.....	ROM.....	DOC.....	20.....	0.2.....	1
Carbon-Organic.....	% wt as C.....	DOOXMAT.....	ORGC.....	100.....	0.01.....	0.05
Chloride.....	mg/L as Cl.....	COCL.....	CLIDUR.....	100.....	0.2.....	1
		PRIC1.....	CLIDUR.....	2.....	0.01.....	0.05
	ug/filt Cl.....	PRLOV.....	CLIDUR.....	100.....	1.....	5
Chlorophyll-a.....	ug/L.....	RCHLO.....	CHLRAT.....	10.....	0.2.....	1
Chlorophyll-acid.....	ug/L.....	RCHLO.....	CHLRAC.....	10.....	N/A.....	N/A
Chlorophyll-b.....	ug/L.....	RCHLO.....	CHLRBT.....	10.....	0.1.....	0.5
Clay.....	% bt wt.....	DOPARTSZ.....	CLAY.....	100.....	1.....	5
Colour - True.....	TCU.....	WCOL.....	COLTR.....	100.....	0.5.....	2.5
	HZU.....	DOCC.....	COLTR.....	100.....	1.....	5
Conductivity.....	uS/cm @25°.....	DOCC.....	COND25.....	300.....	0.2.....	1
		PRIC1.....	COND25.....	100.....	0.2.....	1
		RATS.....	COND25.....	2000.....	1.....	5
		WATS.....	COND25.....	2000.....	1.....	5
		WQSDIRT.....	COND25.....	10000.....	5.....	25

PARAMETER	UNITS	WORKSTATION CODE	TEST CODE	FULL SCALE	W	T
Copper.....	ug/g as Cu.....	DOHMTE.....	CUUT.....	50.....	0.2.....	1.0
	ug/L as Cu.....	DOASV.....	CUUT.....	4.....	0.3.....	1.5
Fluoride.....	mg/L as F.....	DOHME.....	PBUT.....	50.....	0.2.....	1
	ug/L as F.....	DOSPFF.....	FFIDUR.....	100.....	0.2.....	1
Iron - Xdi.....	% wt as Fe.....	DOMETDI.....	FEEDI.....	2.....	0.01.....	0.05
Iron - Xpy.....	% wt as Fe.....	DOMETALX.....	FEEPY.....	1.....	0.01.....	0.05
Lead - Total.....	ug/g as Pb.....	DOHME.....	PBUT.....	50.....	0.2.....	1
Lead.....	ug/L as Pb.....	DOASV.....	PBUT.....	2.....	0.3.....	1.5
Magnesium.....	mg/L as Mg.....	PRAA.....	MGUR.....	0.5.....	0.005.....	0.025
		RMAAS.....	MGUR.....	10.....	0.02.....	0.1
		WAAS.....	MGUR.....	50.....	0.1.....	0.5
Magnesium-Xsc.....	meq/100g Mg.....	DOCATON.....	MGESC.....	2.5.....	0.01.....	0.05
Nickel - Total.....	ug/g as Ni.....	DOHMET.....	NIUT.....	50.....	0.2.....	1.0
Nitrogen-NH ₃ +NH ₄	mg/L as N.....	PRNUT.....	NNHTFR.....	5.....	0.002.....	0.01
			NNHTUR.....	5.....	0.002.....	0.01
		RNDNP.....	NNHTFR.....	2.....	0.002.....	0.01
		SDNP.....	NNHTFR.....	50.....	0.1.....	0.5
	ug/L as N.....	DONUT.....	NNHTFR.....	1000.....	1.....	5
	ug/filt N.....	PRSEQ.....	NNHTFR.....	125.....	0.2.....	1.0
Nitrogen - NO ₃	ug/filt N.....	PRSEQ.....	NNO3FR.....	50.....	0.1.....	1.0
	mg/L as N.....	PRICI.....	NNO3UR.....	2.....	0.01.....	0.05
	ug/filt N.....	PRLOV.....	NNO3UR.....	100.....	0.5.....	2.5
Nitrogen-NO ₃ +NO ₂	mg/L as N.....	RNDNP.....	NNOTFR.....	5.....	0.005.....	0.025
		SDNP.....	NNOTFR.....	50.....	0.1.....	0.5
		WFNO3.....	NNOTUR.....	20.....	0.1.....	0.5
	ug/L as N.....	DONUT.....	NNOTFR.....	500.....	2.....	10
Nitrogen - NO ₂	mg/L as N.....	RNDNP.....	NNO2FR.....	0.25.....	0.001.....	0.005
		SDNP.....	NNO2FR.....	2.....	0.005.....	0.025
Nitrogen-T Kjdl.....	mg/L as N.....	RTNP.....	NNTKUR.....	2.....	0.02.....	0.1
		STKNP.....	NNTKUR.....	25.....	0.05.....	0.25
Oxygen - BOD.....	mg/L as O.....	SBBOD5.....	BOD5.....	400.....	0.2.....	1
Oxygen - COD.....	mg/L as O.....	RCOD.....	COD.....	100.....	1.....	5
			CODF.....	100.....	1.....	5
		SBCOD.....	COD.....	500.....	2.....	10
pH.....		DOCOP.....	PH.....	14.....	N/A.....	N/A
		DOT.....	PH.....	14.....	N/A.....	N/A
		PHACD.....	PH.....	14.....	N/A.....	N/A
		RATS.....	PH.....	14.....	N/A.....	N/A
		WATS.....	PH.....	14.....	N/A.....	N/A
		WQSDIRT.....	PH.....	14.....	N/A.....	N/A

PARAMETER	UNITS	WORKSTATION CODE	TEST CODE	FULL SCALE	W	T
pH - Soil Xca.....		DOSOILPH.....	PHECA.....	14.....	N/A.....	N/A
pH - Soil Xw.....		DOSOILPH.....	PHEW.....	14.....	N/A.....	N/A
Phenolics.....	ug/L Phenol.....	ROPHEN.....	PHNOL.....	50.....	0.2.....	1
Phosphorus-Sol.....	mg/L as P.....	RNDNP.....	PPO4FR.....	0.125.....	0.0005.....	0.002
		SDNP.....	PPO4FR.....	10.....	0.02.....	0.1
Phosphorus-Tot.....	mg/L as P.....	RTNP.....	PPUT.....	0.2.....	0.002.....	0.01
		STKNP.....	PPUT.....	5.....	0.02.....	0.1
	ug/L as P.....	DOP.....	PPUT1.....	200.....	0.2.....	1
Potassium.....	mg/L as K.....	PRAA.....	KKUR.....	1.....	0.005.....	0.025
		RMAAS.....	KKUR.....	5.....	0.01.....	0.5
		WAAS.....	KKUR.....	25.....	0.05.....	0.25
	ug/filt K.....	PRLOV.....	KKUR.....	50.....	0.5.....	2.5
Potassium-Xsc.....	meq/100g K.....	DOCAION.....	KKESC.....	0.75.....	0.01.....	0.05
Sand.....	% by weight.....	DOPARTSZ.....	SAND.....	100.....	1.....	5
Silicon.....	mg/L as Si.....	ROM.....	SIO3UR.....	10.....	0.05.....	0.25
Silt.....	% by weight.....	DOPARTSZ.....	SILT.....	100.....	1.....	5
Sodium.....	mg/L as Na.....	PRAA.....	NAUR.....	1.....	0.005.....	0.025
		RMAAS.....	NAUR.....	20.....	0.02.....	0.1
		WAAS.....	NAUR.....	100.....	0.2.....	1
	ug/filt Na.....	PRLOV.....	NAUR.....	50.....	0.5.....	2.5
Solids - Diss.....	mg/L.....	SOLIDS.....	RSF.....	3000.....	0.5.....	2.5
Solids - Ign.....	mg/L.....	SOLIDS.....	RSFA.....	3000.....	2.....	10
			RSPA.....	3000.....	2.....	10
			RSTA.....	30000.....	20.....	100
Solids - Part.....	mg/L.....	SOLIDS.....	RSP.....	3000.....	1.....	5
Solids - Tot.....	mg/L.....	SOLIDS.....	RST.....	60000.....	10.....	50
Sulphate.....	ug/filt SO ₄	PRSEQ.....	SSO4FR.....	250.....	1.....	5
			SSO4NF.....	250.....	1.....	5
		PRIC1.....	SSO4UR.....	10.....	0.05.....	0.25
	ug/filt SO ₄	PRLOV.....	SSO4UR.....	500.....	1.....	5
	mg/L as SO ₄	RMDSO4.....	SSO4UR.....	100.....	0.5.....	2.5
				20.....	0.1.....	0.5
Sulphate - Xw.....	ug/g as SO ₄	DOANIONX.....	SSO4EW.....	100.....	0.5.....	2.5
Sulphur Dioxide.....	ug/filt SO ₂	PRSEQ.....	SSO2FR.....	350.....	1.....	5
Turbidity.....	FTU.....	RMTUB.....	TURB.....	200.....	0.05.....	0.25
		WTUB.....	TURB.....	200.....	0.05.....	0.25
Zinc - Tot.....	ug/g as Zn.....	DOHMTE.....	ZNUT.....	100.....	0.5.....	2.5
Zinc.....	ug/L as Zn.....	DOASV.....	ZNUT.....	15.....	0.5.....	2.5



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